INDEX.

ILLUSTRATED ARTICLES.

ABUTMENT and Shore Sluices, Plan of, on the Sone Canals, 216
Adjustable Screens for Screening Coals, Briart's, 52
Air Engine, The Howard Superheated, 68, 69
Air Pump for Raising Sewage, Hahn's, at the Vienna Exhibition, 432
Amber, Diving Dress for obtaining, MM. Rouxquayrol-Denayrouz's, at the Vienna Exhibition, 339
American and English Plant for the Bessemer Process, 408
American Plant for the Bessemer Process, 112, 113, 116, 408, 409, 412
American Plant for the Bessemer Process; Horizontal Blowing Engine, 112
American Plant for the Bessemer Process; Regulator, Ingot Crane, Air Furnace, and Cupola, 113
American Plant for the Bessemer Process; the Worthington Duplex Pump, 116
Anticipated Inventions, 109
Apparatus for Driving Sewing Machines, Holmes's, 193
Apparatus for Making Gas from Mineral Oils, Suckow's, at the Vienna Exhibition, 360
Apparatus for Steering Ships of War, Russell's, 338
Apparatus, Taylor's, for Raising Sunken Ships, 247
Apparatus for Water-Lifting, Prall's, 184
Appleby's Steam Crane, at the Vienna Exhibition, 429
Arcades, Blind, Side Elevation of, at the Vienna Exhibition, 342
Armour-Clad, German, the Borussia, 62
Arrangement of Gas Works for Small Towns, M. Le Ferret's, 294
Ashcroft's "Pop" Safety Valve, 386, 389
Attachment for a Slide Rest, New (Mechanical Refinements), 56
Augsberg, Trials of the Sulzer Engine at, 41, 74
"Austria," The, Austrian Locomotive (Engerth's System), at the Vienna Exhibition, 429
Austrian Experiments on Steel and Chilled Shells, 132, 133, 150
AUSTRIAN LOCOMOTIVES AT THE VIENNA EXHIBITION, Constructed at the Maschinenfabrik der K. K. Priv. Staats-Eisenbahn-Gesellschaft, Vienna:
  Locomotive Engine "Austria;" Engerth's System, 429
  Locomotive Engine "Hungaria" (3 ft. 1 4/8 in. Gauge), 421
  Locomotive Engine "Kaiser Franz-Joseph;" Austrian State Railways, 424
  Locomotive Engine "Orient," Haswell's System (3 ft. 8½ in. Gauge), 421
  Locomotive Engine "Stainz;" Haswell's System, 424
Aveling and Porter's Steam Road Roller at the Vienna Exhibition, 369
Axle Box, Sloot's Railway, at the Vienna Exhibition, 401

Barrage across the Nile near Cairo, 25, 28
Base Ring of the Central Rotunda at the Vienna Exhibition, 21
Beam Pumping Engine, J. and H. Gwynne's, 314
Bernays' Centrifugal Pump, at the Vienna Exhibition, 456
Berryman's Feed-Water Heater, 124
Berryman's Feed-Water Regulators, 73
Bessemer Process, American Plant for the, 112, 113, 116, 408, 409, 412
Blast Furnaces, Tuyeres for, 89
Blind Arcades, Side Elevation of, at the Vienna Exhibition, 342
Bloom-Shearing Machine, Wagner and Co.'s Duplex, at the Vienna Exhibition, 460
Blowing Engine, Horizontal; American Plant for the Bessemer Process, 112
Bohlken's Earth Borer, 246
Boiler Explosion on Board the s.s. Druid, 65
Boiler Explosion at the Linthorpe Iron Works, The, 327
Boiler Explosions in 1872, 151, 166
Boiler, Webb's Steel Locomotive, at the International Exhibition, 334, 335
Boilers, Downtake, 77
Boilers and Feed Pumps of the Sulzer Engine, at Augsberg, 41, 74
Borer, Bohlken's Earth, 246
Boring Machine, Horizontal, Constructed by the Chemnitzer Werkzeugmaschinen Fabrik, at the Vienna Exhibition, 361
Boring Machine, Rock, Osterkamp's, at the Vienna Exhibition, 396
Boring and Slot-Drilling Machine, Constructed by the Saechsische Maschinenfabrik, Chemnitz, at the Vienna Exhibition, 472
Boulogne, Proposed Island Harbour at, 221
Brake and Starting Apparatus, Holmes and Taylor's, for Tramway Cars, 193
Breguet's French Electrical Instrument Factory, 393
Briart's Screen, Adjustable, for Screening Coals, 52
Brick-Cutting Table, Clayton's, 246
Bridge, East River, New York Tower of the, 204
Bridge, Paint-street, Providence, Rhode Island, U.S.A., 117
Bridge, Pier of the East River Bridge, New York, The, 256
Burning Powdered Fuel, Crampton's System of, 349, 350, 351
Büttgenbach's Glass Gauge Tubes, 76

Cairo, Barrage across the Nile, near, 25, 28
Caissons of the East River Bridge, New York, Sinking the, 136
Canals, The Sone, 213, 216, 217, 379, 382
Carels' Six-Wheeled Coupled Passenger Engine, at the Vienna Exhibition, 460
Carriage, Railway Kitchen, for the Lower Silesian Railway, at the Vienna Exhibition, 443
Carriage, Russian Imperial, on the Moscow and Koorsk Railway, 435, 438
Carriage, Sleeping, for the Lower Silesian Railway, at the Vienna Exhibition, 361
Carriage, Sleeping, for the North British Railway, 238, 239
Central Rotunda, Section through the, at the Vienna Exhibition, 261
Central Rotunda at the Vienna Exhibition, Base Ring of the, 21
Central Rotunda at the Vienna Exhibition, Scaffolding for the, 98
Centrifugal Pump, Bernays', at the Vienna Exhibition, 456
Chilled and Steel Shells, Austrian Experiments on, 132, 133, 150
Clayton's Brick-Cutting Table, 246
Clayton and Howlett's Post-Compressing Machinery, 356
Coal, Adjustable Screens for Screening, Briart's, 52
Coal Economy, 194
Coal Screen, Revolving, Walker and Cole's, 235
Colonel Clarke's Proposed Island Harbour at Boulogne, 221
Colonel Mann's Sleeping Carriages for English and German Railways, 364, 365
Compound Engines, Action of Steam in The (Flywheel and its Associations), 318, 344
Compound Engines, Coxhead and Miller's Regulator Valves for, 117
Compound Engine, Direct Expansion, Field and Cotton's, at the Vienna Exhibition, 420
Continuous Recording Pressure Gauge, Edson's, 91
Cooke and Whieldon's Signal Light, Westminster, 442
Cooling Machine, for Siag, Wood's, 167, 252, 253
Covered Garden Court at the Vienna Exhibition, 391
Covered Ways at the Vienna Exhibition, 390
Crampton's System of Burning Powdered Fuel, 349, 350, 351
Crane, Appleby's Steam, at the Vienna Exhibition, 429
Cupola for the Bessemer Process, 113
Cutter Lifeboat, White's, 464

Da Costa and Laurie's Sewer Traps, 94
Derrick, A 100-Ton Floating, Used on the New York Dock Works, 371, 372, 374
Details of Fire-engine Pumps, Reinhardt's, at the Vienna Exhibition, 304
Details of Iron Work in the Vienna Exhibition, 268, 269
Details of Pile Foundations at the Vienna Exhibition, 220
Direct Expansion Compound Engine, Field and Cotton's, at the Vienna Exhibition, 420
Distance Measurers, 2, 19, 53, 71, 89, 110, 145, 171, 178, 196, 233, 250, 281, 311
Diving Dress, MM. Rouxquayrol-Denayrouz's, at the Vienna Exhibition, 339
Docks, Floating, for Fire-engines, Maw's, 24
Downtake Boilers, 77
Drilling Machine, Pfaff, Fernau, and Co.'s Radial, at the Vienna Exhibition, 378
Drilling Machine, Rock, Osterkamp's, at the Vienna Exhibition, 396
Drilling Machine for Tyres, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 451
Drilling Machine, Wall, Hind, and Son's, at the Vienna Exhibition, 326
Driving Sewing Machines, Holmes's Apparatus for, 193
Drums, Turner's Winding, for the Mina Santa Gertrudes, Coquimbo, 368, 369
Duplex Bloom Shearing Machine, Wagner's, at the Vienna Exhibition, 460

Eads' Gun Carriage, with Pneumatic Elevating Gear, 4, 5
Earth Borer, Bohlken's, 246
East River Bridge, New York, Brooklyn Pier of the, 256
East River Bridge, New York, Sinking the Caissons of the, 136
East River Bridge, New York, Tower of the, 204,
Economy, Coal, 194
Edson's Continuous Recording Pressure Gauge, 91
Electrical Instrument Factory, A French, 393
Electro-Magnetic Machine, The Gramme, 197
Electrometer, Quadrant, On the, 454
Elevating Gear, Eads' Pneumatic, for Gun Carriages, 4, 5
Ellis's Water Fire-bars, 212
Engine, Air, The Howard Superheated, 68, 69
Engine, Fire, at the Vienna Exhibition, Reinhardt's, 301, 304, 306
Engine, Horizontal Blowing; American Plant for the Bessemer Process, 112
Engine, Locomotive, The "Austria" (Engerth's System) at the Vienna Exhibition, 429
Engine, Locomotive, The "Hungaria" (3 ft. 1 4/8 in. Gauge), at the Vienna Exhibition, 421
Engine, Locomotive, The "Kaiser Franz-Joseph," for the Austrian State Railway, at the Vienna Exhibition, 424
Engine, Locomotive, The "Orient," Haswell's System (3 ft. 8½ in. Gauge), at the Vienna Exhibition, 421
Engine, Locomotive, The "Stainz," Haswell's System, at the Vienna Exhibition, 424
Engine, Paget's Garden, 8
Engine for Straw Burning, Portable, at the Vienna Exhibition, Hansomes, Sims, and Head's, 357
Engine, The Sulzer, 9, 33, 34
Engines, Fairlie, 440
Engierth and Cunzer's Rolling Mill Engine, at the Vienna Exhibition, 457
English and American Plant for the Bessemer Process, 408
Ericsson's Movable Torpedo, 167, 175
Exhaust and Steam Pipes of the "James Spooner," Locomotive, 180
EXHIBITION, THE VIENNA:
  Illustrations, 21, 44, 69, 61, 89, 98, 159, 220, 231, 261, 268, 269, 297, 300, 301, 304, 309, 316, 324, 338, 339, 342, 357, 360, 361, 375, 378, 388, 390, 391, 396, 397, 400, 401, 413, 417, 420, 421, 422, 424, 428, 429, 430, 432, 433, 438, 439, 443, 447, 450, 451, 453, 456, 457, 460, 461, 467, 468, 472, 473
  Base Ring of the Central Rotunda, 21
  Covered Garden Court, 391
  Covered Ways, 390
  Details of Foundations, 220
  Details of Iron Work, 268, 269
  General Description of the Building, 159, 160, 231, 232, 297, 298, 351, 352
  General View of One of the Transepts, 44
  Interior of the Industry Palace, 60
  Interior of the Machinery Annexe, 60
  Locomotives at the, 408, 421, 424, 428, 429, 430, 444, 447, 467, 468
  Part Plan of Industry Palace, 61
  Plan of Lifting Gear for Raising the Base Ring and Standards of Rotunda, 300
  Scaffolding for the Central Rotunda, 98
  Scaffolding for Raising the Roof Girders of the Rotunda, 301
  Section Through the Central Rotunda, 261
  Side Elevation of Blind Arcades, 342
Expansion Valves, 209, 210
Experiments, Austrian, on Steel and Chilled Shells, 132, 133, 150
Explosion of Boiler on Board the s.s. Druid, 65
Explosions, Boiler, in 1872, 151, 166

Fairlie Engines, 440
Fairlie Locomotive for the Festiniog Railway, 180, 181
Feed Pumps and Boilers of the Sulzer Engine, at Augsberg, 41, 74
Feed Water Heater, Berryman's, 124
Feed Water Regulators, Berryman's, 73
Festiniog Railway, Fairlie Locomotive for the, 180, 181
Field and Cotton's Direct Expansion Compound Engine, at the Vienna Exhibition, 420
Fielding and Platt's Hydraulic Chain Cable Shears, 207
Fire-bars, Ellis's Water, 212
Firebed and Tuyere Combined, Roots', 88
Fire Engine, Reinhardt's, at the Vienna Exhibition, 301, 304, 306
Fire Engines, Maw's Floating Docks for, 24
Fireholes of Locomotive Boilers, Webb's, 69
Fittings, Gauge-Glass, Webb's, 80
Floating Derrick, A 100-Ton, used on the New York Dock Works, 371, 372, 374
Floating Docks, Maw's, for Fire Engines, 24

Flywheel, The, and its Associations, 318, 344
Foundations, Heathorn's Subaqueous, 106
Foundations, Pile, Details of, at the Vienna Exhibition, 220
Foundations of Under Sluices of the Sone Canals, 382
Foundations of Weir Wall for the Sone Canals, Method of Sinking, 379
Fouracres' Patent Excavator (Sone Canals), 213
Four-wheeled Tank Locomotive (3 ft. 7 in. Gauge), Constructed by the Carlsruhe Maschinenbau Gesellschaft, at the Vienna Exhibition, 461
French Arrangement of Gas Works for Small Towns, M. Le Perret's, 234
French Electrical Instrument Factory, A, 393
Fuel, Powdered, Crampton's System of Burning, 343, 350, 351
Furnace, Siemens' Revolving, for making Iron and Steel, 320
Furnaces, Air and Cupola, for the Bessemer Process, 113

Galleries or Covered Ways at the Vienna Exhibition, 389
Garden Court, Covered, at the Vienna Exhibition, 391
Garden Engine, Paget's, 8
Gas from Mineral Oils, Suckow's Apparatus for Making, at the Vienna Exhibition, 360
Gas Works for Small Towns, M. Le Perret's Arrangement of, 234
Gauge-Glass Fittings, Webb's, 26
General Plan of the Soudan Railway, 85
General View of one of the Transepts at the Vienna Exhibition, 44
German Armour-Clad, The Borussia, 61
German Railways, Colonel Mann's Sleeping Carriage for the, 265
Girders of the Rotunda at the Vienna Exhibition, Scaffolding for Raising the, 391
Glass Gauge Tubes, Bittigenbach's, 76
Goods Locomotive, Sigl's, for the Royal Hungarian States Railways, at the Vienna Exhibition, 447
Gramme Electro-Magnetic Machine, The, 192
Grinding Rock Salt, Sauerbrey's Mill for, at the Vienna Exhibition, 375
Guillot's Electro-Magnetic Alphabetical Telegraph, 393
Gun Carriage, Eads', with Pneumatic Elevating Gear, 4, 5
Gurit's Naval Telemeter (Telemeters), 196, 197
Gwynne's Beam Pumping Engine, 314

Hahn's Air-Pump for Raising Sewage, at the Vienna Exhibition, 432
Hammer, Steel Tilting, Thwaites and Carbutt's, at the Vienna Exhibition, 417
Harbour, Island, at Boulogne, Colonel Clarke's Proposed, 221
Harbour Works at Oamaru, New Zealand, 282, 283, 284
Head's Reversing Gear for 22-in. Plate Mill, 315
Heater, Berryman's Feed Water, 124
Heathorn's Subaqueous Foundations, 106
Hind and Son's Slotting Machine, at the Vienna Exhibition, 397
Hind and Son's Wall Drilling Machine, at the Vienna Exhibition, 326
Holmes's Apparatus for Driving Sewing Machines, 193
Holmes and Taylor's Starting and Brake Apparatus for Tramway Cars, 193
Horizontal Blowing Engine: American Plant for the Bessemer Process, 112
Horizontal Boring Machine, Constructed by the Chemnitzer Werkzeugmaschinen Fabrik, at the Vienna Exhibition, 361
Horizontal Engine, Bulser's, with Automatic Variable Expansion Gear, 9
Horizontal Rolling Mill Engine, Englerth and Cunzer's, at the Vienna Exhibition, 457
Howard Superheated Air Engine, The, 68, 69
"Hungaria," The, Austrian Locomotive (3 ft. 1½ in. Gauge), at the Vienna Exhibition, 421
Hydraulic Chain Cable Shears, Fielding and Platt's, 287
Hydraulic Shears for Cutting 2½ in. Chain Cables, Thompson, Boyd, and Co.'s, 286

Imperial Carriage on the Moscow and Koorsk Railway, Russia, 435, 438
Industry Palace, Interior of, at the Vienna Exhibition, 60
Industry Palace, Part Plan of, at the Vienna Exhibition, 61
Interior of the Machinery Hall at the Vienna Exhibition, 80
Interior of the "Woolwich Infant," 103
Inventions, Anticipated, 109
Iron Planer, Metal Straps for (Mechanical Refinements), 129
Iron and Steel, Siemens' Direct Process for the Manufacture of, 320
Iron-work, Details of, in the Vienna Exhibition, 268, 269
Island Harbour at Boulogne, Colonel Clarke's Proposed, 221

Kitchen Railway Carriage for the Lower Silesian Railway at the Vienna Exhibition, 443

Lathe Legs (Mechanical Refinements), 57
Lathe, Wheel Turning, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 473
Laurie and De Costa's Sewer Traps, 94
Leder's Tip Wagons, at the Vienna Exhibition, 468
Le Perret's, M., Arrangement of Gas Works for Small Towns, 234
Lifeboat, White's, 464
Lifeboat, Woolfe and Son's, 464
Life Saving at Sea, 464
Lifting Gear for Raising the Base Ring and Standards of Rotunda, at the Vienna Exhibition, 300
Linthorpe Iron Works, The Boiler Explosion at the, 327
Locomotives, Austrian, at the Vienna Exhibition, Constructed at the Maschinenfabrik der K. K. Priv. Staats-Eisenbahn-Gesellschaft, Vienna:
Locomotive Engine "Austria;" Engerth's System, 429
Locomotive Engine "Hungaria" (3 ft. 1½ in. Gauge), 421
Locomotive Engine "Kaiser Franz Joseph," Austrian State Railways, 424
Locomotive Engine "Orient;" Haswell's System (3 ft. 3½ in. Gauge), 421
Locomotive Engine "Steinz;" Haswell's System, 424
Locomotive Boiler, Webb's Steel, at the International Exhibition, 324, 325
Locomotive Boilers, Webb's Fireholes of, 49
Locomotive, The Fairlie, for the Festiniog Railway, 180, 181
Locomotive, Nairn's Road, 228
Locomotive, Sigl's Goods, for the Hungarian States Railways, at the Vienna Exhibition, 447
Locomotive, Tank (3 ft. 7 in. Gauge), Constructed by the Carlsruhe Maschinenbau-Gesellschaft, at the Vienna Exhibition, 461
Locomotive, Tank, for Iron Works, Constructed at the Harzer Iron Works, at the Vienna Exhibition, 450, 451
Locomotive, Tank, for the Upper Silesian Railway, Wohlert's, at the Vienna Exhibition, 422
Locomotives at the Vienna Exhibition, 405, 421, 424, 428, 429, 430, 446, 447, 467, 468
Ludwig's Railway Wheels at the Vienna Exhibition, 460

Machine, The Gramme Electro-Magnetic, 192
Machine, Plate-Bending, at the Vienna Exhibition, 432
Machine, Slot-Drilling and Boring, Constructed by the Sächsische Maschenfabrik, Chemnitz, at the Vienna Exhibition, 472
Machine, Slotting, Hind and Son's, at the Vienna Exhibition, 397
Machine for Treating Slag, Wood's, at the Tees Iron Works, Middlesbrough, 167, 252, 253
Machine, Tyre Drilling, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 451
Machinery for Compressing Peat, Clayton and Howlett's, 356
Machinery Hall at the Vienna Exhibition, Interior of the, 80
Magnetic Alphabetical Telegraph, M. de Guillot's Electro, 393
Manufacture of Steel in France (Paris Notes), 236
Map Showing Proposed New Railways around Paris, 416
Marine Boilers, Pollit and Wigzell's, Spring-Loaded Safety Valves for, 95
Matching and Planing Machine, Richards, London, and Kelley's, 76
Maw's Floating Docks for Fire Engines, 24
Measurers, Distance, 2, 19, 53, 71, 89, 110, 145, 171, 178, 196, 233, 250, 281, 311
Mechanical Refinements, 56, 57, 129
Meter, Water (Mechanical Refinements), 129
Method of Sinking Foundations for Weir Wall of the Sone Canals, 213, 379
Mill for Grinding Rock Salt, Sauerbreys's, at the Vienna Exhibition, 375
Mill, 22-in. Plate—Head's Reversing Gear for, 315
Mina Santa Gertrudes, Coquimbo, Turner's Winding Drums for the, 368, 369
Mineral Oils, Suckow's Apparatus for Making Gas from, at the Vienna Exhibition, 360
Moscow and Koorsk Railway, Russia, Imperial Carriage on the, 435, 438
Motion, Transmission of, 17
Movable Torpedoes, Captain Ericsson's, 107, 175

Nairn's Road Locomotive, 228
Narrow Gauge Railways, Report of Lieut.-Col. Kennedy, 88
Naval Ordnance, Russian, at the Vienna Exhibition, 413
Naval Telemeter, Gurit's (Telemeters), 196, 197
New York Dock Works, A 100-ton Floating Derrick used on the, 371, 372, 374
New York Tower of the East River Bridge, 294
New Zealand, Harbour Works at Oamaru, 282, 283, 284
Nile, Barrage across the, near Cairo, 26, 28
Nolan's Range Finder (Telemeters), 72
Non-Condensing Beam Pumping Engine, Gwynne's, 314
North British Railway, Sleeping Carriage for the, 268, 269
North Sea Ship Canal, The, 49, 106
Nut-Shaping and Slotting Machines, Schone's, at the Vienna Exhibition, 335

Oamaru, New Zealand, Harbour Works at, 282, 283, 284
100-Ton Floating Derrick used on the New York Dock Works, 371, 372, 374
Ordnance, Russian Naval, at the Vienna Exhibition, 413
"Orient," The Austrian Locomotive, Haswell's System (3 ft. 3½ in. Gauge), at the Vienna Exhibition, 421
Osterkamp's Rock-Boring Machine, at the Vienna Exhibition, 396

Paget's Garden Engine, 8
Paint-street Bridge, Providence, Rhode Island, U.S.A., 117
Palace, Industry, Interior of, at the Vienna Exhibition, 60
Palace, Industry, Part Plan of the, 60
Paris Railways, Map Showing Proposed New, around Paris, 416
Patents, Recent, 16, 36
Peat-Compressing Machinery, Clayton and Howlett's, 356
Petroleum Storing, 279, 280
Pfaff, Fernau, and Co.'s Radial Drilling Machine, at the Vienna Exhibition, 378
Pfaff, Fernau and Co.'s Triple-Geared Self-Acting Lathe, at the Vienna Exhibition, 453
Phosphor-Bronze Tuyeres, for Blast Furnaces, 89
Pier of the East River Bridge, New York, The Brooklyn, 250
Pile Foundations, Details of, at the Vienna Exhibition, 220
Pipes, Steam and Exhaust, of the "James Spooner" Locomotive, 180
Planing and Matching Machine, Richards, London, and Kelley's, 76
Planing Machine for the Ends of Rails, Wagner's, at the Vienna Exhibition, 438
Planing Machines, Metal Straps for Working the Tables of (Mechanical Refinements), 129
Plate-Bending Rolls, at the Vienna Exhibition, 432
Plate Mill, 22-in., Head's Reversing Gear for, 315
Pleasure Grounds, Japan, Waters's Suspension Bridge in, 346, 347
Pneumatic Elevating Gear, Eads', for Gun Carriage, 4, 5
"Pop" Safety Valve, Ashcroft's, 388, 389
Portable Engine for Straw Burning, at the Vienna Exhibition, Ransomes, Sims, and Head's, 357
Powdered Fuel, Crampton's System of Burning, 343, 350, 351
Prall's Water-Lifting Apparatus, 184
Pressure Gauge, Edison's Continuous Recording, 91
Proposed Island Harbour at Boulogne, Colonel Clarke's, 221
Pump, Bernays' Centrifugal, at the Vienna Exhibition, 456
Pump, Worthington Duplex; American Plant for the Bessemer Process, 116
Pumps, Fire Engine, Reinhardt's, Details of, at the Vienna Exhibition, 304
Pumping Engine, Beam, J. and H. Gywnne's, 314
Punching and Shearing Machine, Wilder's, 40

Quadrant Electrometer, On the, 454

Radial Drilling Machine, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 378
Rail Ending Machine, Wagner's, at the Vienna Exhibition, 438
Railway Axle Box, Sloot's, at the Vienna Exhibition, 401
Railway Carriage, Kitchen, for the Lower Silesian Railway, at the Vienna Exhibition, 443
Railway Expedition, The Soudan: 146, 147, 162, 163, 164, 185, 186, 200, 201, 225, 226, 249, 276, 353
Towing Dahabeahs up the Nile, 146
Steamer and Dahabeahs Moored for the Night, 147
The Pyramid of Riggs, 162
View on the Nile between Rhoda and Siout, 162
The First Cataract, 163
The Island and Ruins of Philoe, 163
Raising Water for Irrigation, 185
The Shadoof, 200
Higher Cataract of Ambigole, 201
View from the Island of Soleb, near the Cataract of Ambigole, 201
Site of Proposed Bridge at Kohé, 225
A Nile Noggur, 225
View of Handak on the Nile, 249
View of the Nile from Mount Fogo, 276
Sketch in the Bahiuda Desert, near the Wells of Abou Halfa, 276
The Wells of Gakdoul, 353
Plan of the Wells of Gakdoul, 353
Railway Sleeping Carriage for the Lower Silesian Railway, at the Vienna Exhibition, 361
Railway Sleeping Carriage for English and German Railways, Colonel Mann's, 264, 265
Railway, The Soudan, General Plan of the, 85
Railway Wheel Turning Lathe, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 473
Railway Wheels, Ludwig's, at the Vienna Exhibition, 460
Railways, Map Showing Proposed New, round Paris, 416
Railways, Narrow Gauge, Report of Lieut.-Col. Kennedy, 88
Raising the Base Ring and Standards of Rotunda at the Vienna Exhibition, Lifting Gear for, 300
Raising Sunken ships, Taylor's Apparatus for, 247
Range Finder, Nolan's (Telemeters), 72
Ransomes, Sims, and Head's Portable Engine for Straw-burning at the Vienna Exhibition, 357
Recent Patents, 16, 36
Recording Pressure Gauge, Edison's Continuous, 91
Refinements, Mechanical, 56, 57, 129
Regulator, Berryman's Feed Water, 73
Regulator, Ingot Crane, Air Furnace and Cupola; American Plant for the Bessemer Process, 113
Regulator Valves for Compound Engines, Cox-head and Miller's, 117
Reinhardt's Fire Engine Pumps, Details of, at the Vienna Exhibition, 304
Reinhardt's Fire Engines at the Vienna Exhibition, 301, 304, 306
Report of Mr. E. B. Marten on Boiler Explosions in 1872, 151, 166
Reversing Gear for 22-in. Plate Mills, Head's, 315
Revolving Coal Screen, Walker and Cole's, 235
Richards, London, and Kelly's Planing and Matching Machine, 76
Ring, Base, of the Central Rotunda at the Vienna Exhibition, 71
River Sone, Sections of Weir Across the (Sone Canals), 217
Road Locomotive, Nairn's, 228
Road Roller, Steam, at the Vienna Exhibition, Aveling and Porter's, 309
Rock-boring Machine, Osterkamp's, at the Vienna Exhibition, 396
Rock Salt, Mill for Grinding, Sauerbrey's, at the Vienna Exhibition, 375
Rolling Mill Engine, Englerth and Cunzer's, at the Vienna Exhibition, 457
Rolls, Plate-Bending, at the Vienna Exhibition, 432
Rotunda, Central, Scaffolding for, at the Vienna Exhibition, 88
Rotunda, Central, Section through, of the Vienna Exhibition, 261
Rotunda, Central, at the Vienna Exhibition, Base Ring of the, 71
Rouxquayrol-Denayrouz's Diving Dress, at the Vienna Exhibition, 359
Royal Hungarian State Railways, Sigl's Goods Locomotive for the, at the Vienna Exhibition, 447
Russell's Steering Apparatus for Ships of War, 338
Russian Imperial Carriage on the Moscow and Koorsk Railway, 435, 438
Russian Naval Ordnance, at the Vienna Exhibition, 413

Safety Valve, Ashcroft's "Pop," 388, 389
Safety Valves, Pollit and Wigzell's Spring Loaded, for Marine Boilers, 95
Sauerbrey's Mill for Grinding Rock Salt, at the Vienna Exhibition, 375
Saving Life at Sea, 464
Scaffolding for the Central Rotunda of the Vienna Exhibition, 88
Scaffolding for Raising the Girders of the Rotunda at the Vienna Exhibition, 391
Schone's Nut-Shaping and Slotting Machines, at the Vienna Exhibition, 335
Screen, Revolving Coal, Walker and Cole's, 235
Screens for Screening Coal, Briart's Adjustable, 52
Section through the Central Rotunda of the Vienna Exhibition, 261
Self-acting Triple-geared Lathe, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 453
Self-righting Whale Lifeboat, White's, 464
Separator, or Water Extractor, Shepherd's, 16
Separator or Water Extractor, Stockley's, 36
Sewage, Hahn's Air Pump for Raising, at the Vienna Exhibition, 432
Sewer Traps, Da Costa and Laurie's, 94
Sewing Machines, Holmes's Apparatus for Driving, 193
Sewing and Punching Machine, Wilder's, 40
Shears, Fielding and Platt's Hydraulic Chain Cable, 287
Shears, Hydraulic, for Cutting 2½ in. Chain Cables, Thompson, Boyd, and Co.'s, 286
Ship Canal, The North Sea, 49, 106
Shore Sluices and Abutment on the Sone Canals, Plan of (Sone Canals), 213, 216
Siemens' Direct Process for the Manufacture of Iron and Steel, 320
Sigl's Goods Locomotive for the Royal Hungarian States Railways, at the Vienna Exhibition, 447
Signal Light, The Westminster, Whieldon and Cooke's, 442
Sinking the Caissons of the East River Bridge, New York, 136
Sinking Foundations of Weir Wall for the Sone Canals, 379
Six-wheel Coupled Passenger Engine, Carels', at the Vienna Exhibition, 469
Slag Machines, Wood's, at the Tees Iron Works, Middlesbrough, 167, 252, 253
Sleeping Carriage for the Lower Silesian Railway, at the Vienna Exhibition, 361
Sleeping Carriage for the North British Railway, 268, 269
Sleeping Carriages, Colonel Mann's, for English and German Railways, 264, 265
Slide Rest, New Attachment for a (Mechanical Refinements), 56
Sloot's Railway Axle Box, at the Vienna Exhibition, 401
Slot-drilling and Boring Machine, Constructed by the Sächsische Maschinenfabrik, Chemnitz, at the Vienna Exhibition, 472
Slotting Machine, Hind and Son's, at the Vienna Exhibition, 397
Slotting and Nut-shaping Machines, Schone's, at the Vienna Exhibition, 335
Sluices, Foundations of Under, for the Sone Canals, 382
Sluices, Shore, on the Sone Canals, 216
Sone Canals, The, 213, 216, 217, 379, 382
Soudan Railway Expedition, The, 146, 147, 162, 163, 164, 185, 186, 200, 201, 225, 226, 249, 276, 353
Towing Dahabeahs up the Nile, 146
Steamer and Dahabeahs Moored for the Night, 147
The Pyramid of Riggs, 162
View on the Nile between Rhoda and Siout, 162
The First Cataract, 163
The Island and Ruins of Philoe, 163
Raising Water for Irrigation, 185
The Shadoof, 200
Higher Cataract of Ambigole, 201
View from the Island of Soleb, near the Cataract of Ambigole, 201
Site of Proposed Bridge at Kohé, 225
A Nile Noggur, 225
View of Handak on the Nile, 249
View of the Nile from Mount Fogo, 276
Sketch in the Bahiuda Desert, near the Wells of Abou Halfa, 276
The Wells of Gakdoul, 353
Plan of the Wells of Gakdoul, 353

Soudan Railway, General Plan of the, 85
Spring-Loaded Safety Valves for Marine Boilers, Pollit and Wigzell's, 95
"Stainz," The Austrian Locomotive Engine, Haswell's System, at the Vienna Exhibition, 424
Starting and Brake Apparatus, Holmes and Taylor's, for Tramway Cars, 193
Steam Crane, Appleby's, at the Vienna Exhibition, 439
Steam and Exhaust Pipes of the "James Spooner" Locomotive, 180
Steam Road Roller, at the Vienna Exhibition, Aveling and Porter's, 309
Steel and Chilled Shells, Austrian Experiments on, 132, 133, 150
Steel Locomotive Boiler, Webb's, at the International Exhibition, 334, 335
Steel Tilting Hammer, Thwaites and Carbutt's, at the Vienna Exhibition, 417
Steering Apparatus, Russell's, for Ships of War, 338
Storing Petroleum, 279, 280
Straw-Burning Portable Engine at the Vienna Exhibition, Ransomes, Sims, and Head's, 357
Subaqueous Foundations, Heathorn's, 106
Suckow's Apparatus for Making Gas from Mineral Oils, at the Vienna Exhibition, 360
Sulzer Brothers' Horizontal Engine with Automatic Variable Expansion Gear, 9
Sulzer Engine, The, 33, 34
Sulzer Engine, Trials of the, at Augsberg, 41, 74
Sunken Ships, Taylor's Apparatus for Raising, 247
Superheated Air Engine, The Howard, 68, 69
Suspension Bridge, Waters's, in Japan, 346, 347
Swing Bridge at Providence, 202
System of Burning Powdered Fuel, Crampton's, 349, 350, 351

Table, Clayton's Brick-Cutting, 246
Tank Locomotive (2 ft. 7 in. Gauge), Constructed by the Maschinenbau-Gesellschaft, Carlsruhe, at the Vienna Exhibition, 461
Tank Locomotive for Iron Works, Constructed at the Harzer Iron Works, at the Vienna Exhibition, 450, 451
Tank Locomotive, Wohlert's, for the Upper Silesian Railway, at the Vienna Exhibition, 422
Taylor's Apparatus for Raising Sunken Ships, 247
Telemeters, 2, 19, 53, 71, 89, 110, 145, 171, 178, 196, 233, 250, 281, 311
Telemeters, Gurit's Naval (Telemeters), 196, 197
Thompson, Boyd, and Co.'s Hydraulic Shears for Cutting 2¼ in. Chain Cables, 286
Thwaites and Carbutt's Steel Tilting Hammer, at the Vienna Exhibition, 417
Tip Wagons, Leder's, at the Vienna Exhibition, 433
Tool-Holder for Bar Steel (Mechanical Refinements), 57
Torpedoes, Movable, Captain Ericsson's, 107, 175
Tower, The New York, of the East River Bridge, 204
Tramway Cars, Holmes and Taylor's Starting and Brake Apparatus for, 193
Transept at the Vienna Exhibition, General View of, 44
Transmission of Motion, 17
Traps, Sewer, Da Costa and Lawrie's, 94
Treadle for Lathe (Mechanical Refinements), 57
Trials at Augsberg of the Sulzer Engine, 41, 74
Triple-Geared Self-Acting Lathe, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 453
Turner's Winding Drums for the Mina Santa Gertrudes, Coquimbo, 368 369
Tuyere and Firebed Combined, Roots's, 36
Tuyeres for Blast Furnaces, 89
Tweddell's Hydraulic Shears, 286, 287
Tyre-Drilling Machine, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 451

Under Sluices of the Sone Canals, Foundations for, 382
Utilisation of Blast Furnace Slag, 167, 202, 253, 266

Valves, Expansion, 209, 210
Variable Expansion Gear, Automatic, for Sulzer's Horizontal Engine, 9
VIENNA EXHIBITION, THE:
Illustrations, 21, 44, 60, 61, 80, 96, 150, 220, 231, 261, 268, 269, 297, 300, 301, 304, 309, 328, 334, 345, 339, 342, 357, 360, 361, 375, 378, 386, 390, 391, 396, 397, 400, 401, 413, 417, 420, 421, 422, 424, 428, 429, 430, 432, 435, 438, 439, 445, 447, 450, 451, 453, 456, 457, 460, 461, 467, 468, 472, 473
Base Ring of the Central Rotunda, 21
Covered Garden Court, 391
Covered Ways, 300
Details of Foundations, 220
Details of Ironwork, 268, 269
General Description of the Building, 159, 160, 231, 232, 297, 298, 331, 332
General View of one of the Transepts, 44
Interior of the Industry Palace, 60
Interior of the Machinery Annexe, 80
Locomotives at the, 405, 428, 429, 430
Part Plan of Industry Palace, 61
Plan of Lifting Gear for Raising the Base Ring and Standards of Rotunda, 300
Scaffolding for the Central Rotunda, 99
Scaffolding for Raising the Roof Girders of the Rotunda, 301
Section through the Central Rotunda, 231
Side Elevation of Blind Arcades, 342
Transepts of the, 44
Vienna Water Works, Plan of, 387

Wagner and Co.'s Duplex Bloom Shearing Machine, at the Vienna Exhibition, 460
Wagner's Rail-Ending Machine, at the Vienna Exhibition, 438
Waxons, Leder's Tip, at the Vienna Exhibition, 433
Walker and Cole's New Revolving Coal Screen, 235
Wall-Drilling Machine, Hind and Son's, at the Vienna Exhibition, 326
Waste Plugs and Traps, 94
Water Extractor or Separator, Shepherd's, 16
Water Extractor or Separator, Stockley's, 36
Water Firebars, Ellis's, 219
Water-Lifting Apparatus, Prall's, 184
Water Meter (Mechanical Refinements), 129
Water Regulators, Berryman's Feed, 75
Water Works, Vienna, Plan of, 387
Waters's Suspension Bridge in Japan, 346, 347
Ways, Covered, at the Vienna Exhibition, 300
Webb's Firebolts of Locomotive Boilers, 49
Webb's Gauge-Glass Fittings, 56
Webb's Steel Locomotive Boiler at the International Exhibition, 334, 335
Weir across the River Sone, Sections of (Sone Canals), 217
Weir Wall of the Sone Canals, Sinking Foundations for, 379
Westminster Signal Light, 442
Whale Lifeboat, White's Self-Righting, 464
Wheel-Turning Lathe, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 473
Wheels, Ludwig's Railway, at the Vienna Exhibition, 400
White's Lifeboats, 464
Whitelaw and Cooke's Signal Light, Westminster, 442
Wilder's Punching and Shearing Machine, 40
Winding Drums, Turner's, for the Mina Santa Gertrudes, Coquimbo, 368, 369
Wohlert's Tank Locomotive for the Upper Silesian Railway, at the Vienna Exhibition, 422
Wood's Slag Machines at the Tees Iron Works, Middlesbrough, 167, 252, 253
Woolfe and Son's Lifeboat, 464
"Woolwich Infant," Interior of the, 103
Worthington Duplex Pump; American Plant for the Bessemer Process, 116

Yeddo, Japan, Waters's Suspension Bridge in, 346, 347

TWO-PAGE ENGRAVINGS.

BREWING Plant at the Vienna Exhibition. To adjoin page 402
Bridge, The East River, New York; Transverse Section of New York Caisson. To adjoin page 165
Bridge, The East River, New York; Excavating Machinery Brooklyn Caisson. To adjoin page 278
Bridge, The East River, New York, Details of Air Shaft of New York Caisson. To adjoin page 296
Bridge, The East River, New York, Transverse Section of Brooklyn Caisson and Details of Dredging Apparatus. To adjoin page 296
Bridge, the East River, New York; Details of Air Locks for Brooklyn Caisson. To adjoin page 414
Bridge, The East River, New York; Longitudinal Section of New York Caisson. To adjoin page 79
Bridge, The East River, New York; Longitudinal Section of Brooklyn Caisson. To adjoin page 248
Bridge, The East River, Plans of New York Caisson. To adjoin page 118
Bridge over the River Aire at Leeds. To adjoin page 443
Bridge over the River Danube at Pesth. To adjoin page 444
Bridge, Swing, at Providence, U.S.A. To adjoin page 117
Bridge, Swing, at Providence, U.S.A., Details of. To adjoin page 202
Canals, The Sone; Map of District and Head Works. To adjoin page 178
Carriage, Imperial, on the Moscow and Koorsk Railway. To adjoin page 436
Carriage, Kitchen, for the Lower Silesian Railway. To adjoin page 423
Carriage, Sleeping, for the Lower Silesian Railway. To adjoin page 361
Carriage, Sleeping, for the North British Railway. To adjoin page 238
Carriage, Sleeping, for Service on German Railways. To adjoin page 265
Derrick, Floating (100-ton), for the New York Department of Docks. To adjoin page 371
Engine, Sulzer's Horizontal Condensing. To adjoin page 9
Engine, Sulzer's Horizontal, Details of. To adjoin page 33
Engine, Wanniesk and Koppner's Corliss, at the Vienna Exhibition. To adjoin page 375
Engines of the Egyptian Steamship "Fayoume." To adjoin page 335
Engines, Horizontal Winding (Hartnell and Guthrie's Patent) for the Mina Santa Gertrudes, Coquimbo. To adjoin page 369
Ironclad Frigate "Borussia," The German. To adjoin page 61
Locomotive, Carels' Six coupled, at the Vienna Exhibition. To adjoin page 459
Locomotive "James Spooner," The Fairlie, for the Festiniog Railway. To adjoin page 179
Locomotive, Tank (2 ft. 7 in.) for the Royal Hungarian Coal Mines. To adjoin page 468
Locomotive, Tank, for the Upper Silesian Railway. To adjoin page 422
Malt Kiln and Malt Turning Apparatus at the Vienna Exhibition. To adjoin page 444
Vienna Exhibition; Details of Columns for Lantern of Central Rotunda (*Two Plates*). To adjoin page 260
Vienna Exhibition; Details of Nave and Transept. To adjoin page 127
Vienna Exhibition; Details of Roof Girders and Plates of Central Rotunda. To adjoin page 280
Vienna Exhibition; Double Columns of Rotunda. To adjoin page 298
Vienna Exhibition; Elevations of Central Rotunda and End Transepts of Industry Palace To adjoin page 159
Vienna Exhibition; Elevations of Corner Pavilion and Side Entrance. To adjoin page 187
Vienna Exhibition, General Plan of. To adjoin page 1
Vienna Exhibition; Interior View of Rear Grand Entrance. To adjoin page 260
Vienna Exhibition; Scaffolding and Lifting Gear used in Erecting Rotunda. To adjoin page 297
Vienna Exhibition; Section of Central Rotunda and End Elevation of Transepts. To adjoin page 229
Vienna Exhibition, Side Elevation and Section of Side Entrance. To adjoin page 302
Vienna Exhibition; Side Elevation of Transept and Nave. To adjoin page 402
Vienna Exhibition; Side View and Section of Great Entrance. To adjoin page 343
Vienna Exhibition; Standards for Central Rotunda. To adjoin page 269
Wagon, Goods, for the Madeira and Mamoré Railway (metre Gauge). To adjoin page 279
Wagon, Low-sided, for the Madeira and Mamoré Railway (metre gauge). To adjoin page 402
Wagon, Platform, for the Madeira and Mamoré Railway (metre gauge). To adjoin page 468

LITERATURE.

Shipwrecks: Reprinted from the *Nautical Magazine*. Why Wrecks Happen, How Wrecks Happen, and How to Prevent Them, 231

Tables for the Use of Engineers and Architects in Taking out Quantities of Masonry, Ironwork, &c. By J. C. Bellamy, C.E., 285

Travaux Publics des Etats Unis d'Amérique en 1870. Rapport de Mission par M. Malezieux, Ingénieur-en-Chef, Professeur à l'Ecole Nationale des Ponts et Chaussées. Publié par ordre de M. le Ministre des Travaux Publics, 161

Works in Iron. Bridge and Roof Structures. By Ewing Matheson, 349

GENERAL INDEX.

A B C Process, The, 12
Absorbent Closet System, Goux's, 258
Academy of Sciences, Paris, The, 123
Adams, W. B., upon the Patent Laws, 182
Address of the President of the Iron and Steel Institute, 299, 312, 339, 370
Adjustable Screen, Briart's, for Screening Coal, 52
Admiralty Works, The Directorship of, 426
Aërial Navigation, 22
Agricultural Engines at the Vienna Exhibition, 449
Agricultural Machinery Hall at the Vienna Exhibition, Regulations for Exhibits, 49
Agricultural Machinery at the Vienna Exhibition, Trials of, 102, 229
Air Brake, The Westinghouse, 119
Air, Compressed, The Use of for Actuating Mining Machinery, 27
Air Engine, The Howard Superheated, 69
Air Engine, Wenham's Heated, 336
Air Pump for Raising Sewage, Hahn's, at the Vienna Exhibition, 432
Allen Governor, The, 317
Amber, MM. Rouxquayrol-Denayrouze's Diving Dress for obtaining, at the Vienna Exhibition, 339
Amendment Bill, Patent Law, 139
American *v.* French Railways, 184
American Military Engineering, 207
American Plant for the Bessemer Process, 113, 409
American Section at the Vienna Exhibition, 316
AMERICAN SOCIETY OF CIVIL ENGINEERS:
On Experimental Strains upon a Bowstring Trussed Girder, by General T. G. Ellis, 22
On Rail Economy, by C. P. Sandberg, 58, 463
On Records of Experiments showing the Character and Position of Neutral Axes, as seen by Polarised Light, by Louis Neckerson, 54, 391
On Experiments on the Resistance of Stones to Crushing, by C. B. Richards, 94
On Rock Drilling, by F. Collingwood, 94
On Retaining Walls, by Mr. Casimir Constable, 267
Communication from General Smith upon the Importance of Testing American Iron and Steel, 391
On Pneumatic Foundations, by General W. S. Smith, 391
On Shaw's Gunpowder Pile driver, by S. R. Probasco, C.E., 463
Ammonia, Employment of, 236
Analysis of Caesium, 50
Annexe for Machinery at the Vienna Exhibition, 79
Annexes and Pavilions at the Vienna Exhibition, 366
Anniversary Meeting of the Institution of Mechanical Engineers at Birmingham, 79
Annual Meeting of the Chesterfield and Derbyshire Institute of Civil and Mechanical Engineers, 399
Annual Soirée of the Royal Society, 307
Anticipated Inventions, Some, 109
Anti-Incrustators, 94
Apparatus for Driving Sewing Machines, Holmes's, 193
Apparatus for Drying Malt, at the Vienna Exhibition, 444
Apparatus for Making Gas from Mineral Oils, Suckow and Co.'s, at the Vienna Exhibition, 380
Apparatus, Hydraulic, for Closing Shops, 164
Apparatus for Raising Sunken Ships, Taylor's, 347
Apparatus for Saving Life at Sea, 293, 397, 469
Apparatus for Water Lifting, Prall's, 184
Appleby's Steam Crane, at the Vienna Exhibition, 439
Architecture, Naval, and Professor Rankine, 31
Armour-Clad, The Borussia, 61
Armour and Guns, 78
Armour Plating, 45, 99, 119, 153, 205
Armour, Substitutes for, 45, 99, 119, 153, 205
Arrangement for Gas Works for Small Towns, M. Le Perret's, 256
Arrangement of Scaffolding at the Vienna Exhibition, 389
Art Castings at the Vienna Exhibition, 426, 466
Artificial Stone, Ransome's, 264
Artificial Stone in Rhineland, 264
Artillery, Heavy Russian, at the Vienna Exhibition, 406, 414
Ashcroft's "Pop" Safety Valve, 389
Association, British, of Gas Managers, 425, 445
Association, The Manchester Steam Users', Annual Meeting of, 240
Atlantic Telegra. hy, 344
Atlantic, The Wreck of the, 272
Augsberg, The Sulzer Engine Trials at, 41, 58, 74
Australia, Iron Industry in, 134
Australia, Railways in, 180
Austrian Experiments on Steel and Chilled Shells, 183, 149
Austrian Railway Carriages, 470
Automatic Variable Expansion Gear, Sulzer's, for Horizontal Engine, 9
Aveling and Forter's Road Roller, at the Vienna Exhibition, 310
Axle Box, Sloot's Railway, at the Vienna Exhibition, 401

Barrage across the Nile, near Cairo, 25
Barret, M., on Storing Petroleum, 279
Beam Pumping Engine, J. and H. Gwynne's, 314
Beetroot, Machinery for the Manufacture of Sugar from, at the Vienna Exhibition, 347
Bernays' Centrifugal Pump, 456
Berryman's Feed Regulators, 73
Berryman's Feed Water Heater, 124
Bessemer Process, The, 113, 409
Bill, Mr. Plimsoll's, 223
Birmingham, Anniversary Meeting of the Institution of Mechanical Engineers at, 79
Blast Furnace Slag, The Utilisation of, 167, 170, 252
Blast Furnaces, Tuyeres for, 89
Board of Trade, The, and Future Shipping Legislation, 289, 321, 383
Bohlken's Earth Borer, 246
Boiler Explosion on Board the s.s. Druid, 65, 100, 121
Boiler Explosion, The Howard, 396, 431
Boiler Explosion at the Linthorpe Iron Works, Middlesbrough, 327
Boiler Explosions in 1872, 151, 168
Boiler, Steel Locomotive, Webb's, at the International Exhibition, 334
Boilers, Downtake, 77
Bontemps's Pneumatic Telegraph, 471
Boring Machine, Horizontal, Constructed by the Chemnitzer Werkzeugmaschinen Fabrik, at the Vienna Exhibition, 361
Boring and Slot-Drilling Machine, at the Vienna Exhibition, 472
Borussia, The, German Armour-clad, 61
Boulogne, Colonel A. Clarke's Proposed Island Harbour at, 222
Bow and Stern Screw Ship, 452
Bowstring Trussed Girder, Experimental Strains upon a, 22
Brake and Starting Apparatus, Holmes and Taylor's, for Tramway Cars, 194
Brakes, Continuous, 29
Brazil, Progress in, 227
Brazilian Submarine Cable, The, 384
Brégnet's Electrical Instrument Factory, 393
Brewing Plant at the Vienna Exhibition, 402
Briart's Adjustable Screens for Screening Coal, 52
Brick-cutting Table, Clayton's, 246
Bridge, The East River, 79
Bridge, The East River, Colonel W. A. Roebling's Report on, 117, 134, 165, 198, 248, 254, 278, 296, 331, 434
Bridge, Gunthorpe, Laying the Foundation Stone of, 368
Bridge, Japanese Suspension, 339
Bridge, The New Leeds, 463
Bridge, The New Perth, 444
Bridge, Paint-street, Providence, U.S.A., 117, 202
Bridge of Sureanes, The, 199
British Association of Gas Managers, The, 425, 445
British Commission, The, at the Vienna Exhibition, 316
Brussels, Water Supply of, 236
Bunkers, Coal, as a Substitute for Armour, 153, 205

Cable, The Brazilian Submarine, 384
Cable, The Vitality of a Submarine, 425
Cables, The Atlantic, 344
Caesium, Analysis of, 50
Cairo, Barrage Across the Nile, near, 25
Canadian Plumbago, 123
Canal, The Darien Ship, 275
Canal, The Panmben Ship, 445
Canals, The Sone, 179, 213, 373
Canals, Traction on, 354
Cane-sugar Apparatus, at the Vienna Exhibition, 347
Captain Ericsson's Movable Torpedoes, 107
Captain Ericsson's Torpedo, Letter to the Secretary of the United States Navy, 26
Carel's Passenger Locomotive, at the Vienna Exhibition, 459
Carriage, Railway Kitchen, for the Lower Silesian Railway at the Vienna Exhibition, 445
Carriage, Railway Sleeping, for the Lower Silesian Railway, at the Vienna Exhibition, 361
Carriage, Sleeping, for the North British Railway, 238
Carriages, Austrian Railway, 470
Carriages, Colonel Mann's Railway Sleeping, 363
Carriages, Railway Sleeping, 238, 263, 271, 361
Cars, Steam-Moved Street, 237
Castings, Art, at the Vienna Exhibition, 426, 466
Cast Iron in France, Production of, during 1872, 226
Casting Metal under Compression, 380
Catalogue, The General Official, at the Vienna Exhibition, 333
Catalogue, The Swiss, at the Vienna Exhibition, 385
Centrifugal Pump, Bernays', 456
Chain Cable Shears, Fielding and Platt's Hydraulic, 287
Chair of Engineering, Glasgow, The, 206
Charcoal Filtration for Water Works, 470
Chemical Society, The, 217
Chesterfield and Derbyshire Engineers' Institute, The, 50, 267, 399
Chilled and Steel Shells, Austrian Experiments on, 132, 149
City of Aberdeen, Trial Trip of, 442
Civil Engineers, Conversazione of the Institution of, 385
Civil Engineers, The French Society of, 125
CIVIL ENGINEERS, THE INSTITUTION OF:
On the Practice and Results of Irrigation in Northern India, by Colonel W. H. Greathed, 70
On Cylindrical or Columnar Foundations in Concrete, Brickwork, and Stonework, by Mr. John Milroy, 78
On the Relative Advantages of the 5 ft. 6 in. Gauge, and of the Metre Gauge, for the State Railways of India, Particularly for those of the Punjab, by W. F. Thornton, 92
On the Mont Cenis Tunnel, by T. Bopwith, jun., 218
On the Rise and Progress of Steam Locomotion on Common Roads, by Mr. John Head, 254
On the Rigi Railway, by Dr. W. Pole, 303
On the History of the River Clyde, by W. J. Dean, 326
On the Delta of the Danube, and the Provisional Works Executed at the Sulina Mouth, by Sir C. A. Hartley, 336
Civil Engineers, The Institution of, *v.* the Narrow Gauge, 403
Clarke's, Colonel, Proposed Island Harbour at Boulogne, 222
Clayton's Brick-Cutting Table, 246
Clayton and Howlett's Peat-Compressing Machinery, 245, 356
Cleveland District, The, 31
Cleveland, Iron Manufactured Trade of, 102
Cleveland Iron Trade, Foremen's Association, Special Meeting of, 380
Cleveland, Notes, from, 7, 27, 51, 62, 86, 106, 124, 130, 158, 174, 186, 203, 227, 245, 262, 288, 288, 310, 315, 341, 367, 400, 423, 450, 459
Closet System, Goux's Absorbent, 258
Closet System, Moule's Earth, 242
Clyde, The River, 326, 352
Clyde Shipbuilding and Marine Engineering in 1872, 79, 123
Coal Bunkers as a Substitute for Armour, 153, 205
Coal in Dalmatia, 50
Coal-Dust Furnace, Crampton's, 294
Coal Screen, Walker and Cole's Revolving, 236
Coal Tank Ends for Ironclads, 153, 205
Coke Ovens, The Laumonier, 236
College for Civil Engineering at Yeddo, Establishment of a, 253
Commission, The British, at the Vienna Exhibition, 316
Common Roads, Steam on, 254, 278, 295
Communication in Trains, Colonel Binney's System, 48, 93
Compagnie Parisienne d'Eclairage et de Chauffage par le Gaz, 380
Company, The Native Guano, 100, 137
Composite Gunboats, 129, 140
Compound Engine, Field and Cotton's, at the Vienna Exhibition, 421
Compound Engines, Action of Steam in (Flywheel and its Associations), 318, 348, 364
Compound Engines, Coxhead and Miller's Regulating Valves for, 117
Compressed Air for Actuating Mining Machinery, The Use of, 27
Compressing Machinery, Peat, Clayton, and Howlett's, 356
Concentration of Sulphuric Acid, 22
Contemporaneous Irrigation in Italy, 87, 71, 111, 170, 189, 214
Continental Brewing Plant at the Vienna Exhibition, 402
Continuous Brakes, 29
Control of Floods, The, 343
Conversazione, The, of the Institution of Civil Engineers, 385
Cooling Machines for Slag, Wood's, 167, 253
Corliss Engine, Wannieck's, 375
Corliss Engines, The, at the Vienna Exhibition, 453
Count Stalberg Wernigerode's Iron Foundry at Ilsenburg, Harz, 426
Counter, The Guebhard, 194
Courts, Covered Garden, at the Vienna Exhibition, 390
Covered Ways at the Vienna Exhibition, 390
Coxhead and Miller's Regulator Valves for Compound Engines, 117
Crampton's Coal-Dust Furnace, 294
Crane, Appleby's Steam, at the Vienna Exhibition, 439
Custom House Regulations for the Vienna Exhibition, 34
Cylinder Foundations, 78

Da Costa and Lawrie's Sewer Traps, 94
Dalmatia, Coal in, 50
Danube, The Delta of the, 336
Danube, Gouin's New Bridge for Crossing the River, at Pesth, 444
Darien Ship Canal, The, 275
Defence of the Royal Gun Factories, The, 138
Delta of the Danube, The, 336
Details of Fire Engine Pumps, Reinhardt's, at the Vienna Exhibition, 391
Details of Foundations at the Vienna Exhibition, 220
Details of Ironwork at the Vienna Exhibition, 268
Derbyshire and Chesterfield Institute of Mining, Civil, and Mechanical Engineers, 50, 267, 399
Derrick, A 100-ton Floating, 371
Devastation, The First 35-ton Gun for the, 43
Devastation, H.M.S., The, 257
Devastation, H.M.S., Sir Spencer Robinson on the, 363
Devastation, H.M.S., Trial of, 272
Dimensions of Locomotive Engines, Table of, at the Vienna Exhibition, 407
Dinner to the Exhibitors at the Vienna Exhibition, 366
Direct Process for the Manufacture of Iron and Steel, Siemens', 320
Directorship, The, of Admiralty Works, 426
Discussion at the Institution of Civil Engineers upon Narrow Gauge Railways, 187
Distance Measurers, 2, 19, 53, 71, 89, 110, 145, 171, 178, 196, 233, 250, 281, 311
Distress Signals, 306
District, The Cleveland, 31
Districts, Railway, 32
Dividends of the Joint-Stock Companies in Germany, 35
Diving Dress, MM. Rouxquayrol-Denayrouze's, at the Vienna Exhibition, 339
Domestic Engines, 94
Double-Beat Valves, Engines with, at the Vienna Exhibition, 454
Downtake Boilers, 77
Drilling Machine, Hind and Son's, at the Vienna Exhibition, 326
Drilling Machine, Radial, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 379
Drilling Machine, Rock, Osterkamp's, 395
Drilling Machine, Tyre, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 451
Drying Malt, Apparatus for the Vienna Exhibition, 444
Driving Sewing Machines, Holmes's Apparatus for, 193
Duplex Bloom Shearing Machine, Wagner's, at the Vienna Exhibition, 460
Dynamite, Experiments with, 120
Dynamite, Historical Sketch of, 55
Dynamite, *v.* Powder, 22

Eads' Gun Carriage with Pneumatic Elevating Gear, 5
Earth Borer, Bohlken's, 246
Earth Closet System, Moule's, 242
East River Bridge, The, 79
East River Bridge, Colonel W. A. Roebling's Report on the, 117, 134, 165, 198, 248, 254, 278, 296, 331, 434
Economy of Fuel, 266
Economy, Rail, 46
Economy, Steam Engine, 122, 140, 154, 258, 290
Edson's Recording Steam Gauge, 90
Effect of Light on Selenium, 138
Egyptian Steamship, The Fayoume, Engines of the, 332
Electric Signal Light for the House of Commons, 384
Electrical Instrument Factory, A French, 393
Electro-Magnetic Machine, Gramme's, 94, 192, 291
Electrometer, Quadrant, On the, 434
Ellis's Water Firebar, 212
Employment of Ammonia, 236
Engine, Compound, Field and Cotton's, at the Vienna Exhibition, 421
Engine, A "Non-radiating," 323
Engine, Pumping, Employed at the Trimdon Grange Colliery, 6
Engine for Straw-burning, Portable, Ransomes, Sims, and Head's, at the Vienna Exhibition, 387
Engine, The Sulzer, 33, 41, 58, 74

Engine, Wanniock's Corliss, 375
Engineering, American Military, 207
Engineering, The Glasgow Chair of, 206
Engineering Progress in Japan, 253
ENGINEERS, THE AMERICAN SOCIETY OF CIVIL:
On Experimental Strains upon a Bowstring Trussed Girder, by Gen. T. G. Ellis, 27
On Road Economy, by C. P. Sandberg, 88, 463
On Records of Experiments showing the Character and Position of Neutral Axes, as Seen by Polarised Light, by Louis Nickerson, 54, 391
On Experiments on the Resistance of Stones to Crushing, by C. R. Richards, 94
On Rock Drilling, by F. Collingwood, 94
On Retaining Walls, by Mr. Casimir Constable, 267
Communication from General Smith upon the Importance of Testing American Iron and Steel, 391
On Pneumatic Foundations, by General W. S. Smith, 391, 392
On Shaw's Gunpowder Pile Driver, by S. R. Probasco, C.E., 463
Engines, Agricultural, at the Vienna Exhibition, 445
Engines, Corliss, at the Vienna Exhibition, 453
Engines, Domestic, 94
Engines with Double-beat Valves, at the Vienna Exhibition, 454
Engines, Fire, Maw's Floating Docks for, 25
Engines, Locomotive, at the Vienna Exhibition, 404, 427, 446, 467
Engines, Marine, at the Vienna Exhibition, 332
Engines, Stationary, at the Vienna Exhibition, 418, 437, 453
Engines of the Steamship Fayoume, The, 333
Engines, Winding, for the Mina Santa Gertrudes, 369
Englerth and Cunzer's Rolling Mill Engine, at the Vienna Exhibition, 457
Estimates, The Navy, 224
Evans, Mr., and the Fairlie System, (The Test of Time), 293
Exhibition, The International, of 1873, 224, 243, 284, 394
EXHIBITION, THE VIENNA:
Agricultural Engines, 443
Art Castings, 426, 466
British Commission, The, 316
Count Stolberg Wernigerode's Iron Foundry at Ilsenburg, Harz, 426
Covered Garden Courts, 390
Covered Ways, 390
Custom House Regulations, 34
General Description of Buildings, I., 1; II., 57; III., 127; IV., 149; V., 177; VI., 195; VII., 231; VIII., 260; IX., 269; X., 280; XI., 297; XII., 331; XIII., 353
General Official Catalogue, The, 333
History of Prices, 29
Locomotives, 404, 427, 446, 467
Marine Engines, 332
Opening of the Vienna Exhibition, 324
Ordnance: Russian Naval Guns, 414
Pavillions and Annexes, 366
Prize Medals at Vienna, 392
Prizes for Foreign Foremen, 83
Progress of the Exhibition, 273, 292, 308, 345, 365, 388
Regulations for Admission to the Exhibition, 310
Regulations for Exhibits in the Machinery Hall, 49
Regulations for the Protection of Inventions, 66, 347
Rotunda, In the, 345
Russian Heavy Artillery, 406, 414
Stationary Engines, 418, 437, 453
Straw-burning Portable Engine, 357
Sugar Machinery, 347
Swiss Catalogue, The, 385
Table Showing the Number of Exhibitors in the Various Groups, 333
Transport of the 12-in. 46-ton Russian Gun from Aboukow to the Vienna Exhibition, 406
Trials of Agricultural Machinery, 102, 229
United States Section, The, 316
Expedition, The Soudan Railway, 146, 163, 185, 200, 225, 249, 275, 353
Expeditions for Laying Submarine Cables, 427
Expenditure and Receipts of the Pennsylvania Railroad, 393
Experimental Strains upon a Bowstring Trussed Girder, 27
Experimental Trials with the Kromschroder Gas, 406
Experiments, Austrian, on Steel and Chilled Shells, 132, 149
Experiments with Dynamite, 120
Experiments on the Resistance of Stones to Crushing, 94
Explosion of Boiler on Board the s.s. Druid, 65, 100, 121
Explosion of a Howard Boiler, 398, 431
Explosions, Boiler, in 1872, 151, 169
Extensions, Indian Railway, 92
Extensions, Telegraphic, in 1872, 156

Face Lathe, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 456
Fairlie's Locomotive, "The James Spooner," for the Festiniog Railway, 179
Fairlie *v.* Meyer, 139
Fairlie *v.* Meyer, Letters to the *Chronique de l'Industrie*, 9, 134
Fast Steam Launches, Thorneycroft's, 165, 199
Fayoume, Steamship, Engines of the, 333
Feed Regulators, Berryman's, 74
Feed-Water Heater, Berryman's, 194
Festiniog Railway, Fairlie's Locomotive for the, 179
Field and Cotton's Compound Engine at the Vienna Exhibition, 431
Fielding and Platt's Hydraulic Chain-Cable Shears, 287
Filtration for Water Works, Charcoal, 479
Finland, Goldin, 85
Fire Engine at the Vienna Exhibition, Reinhardt's, 301, 386
Fire Engines, Maw's Floating Docks for, 25
Firebar, Ellis's Water, 212
Fireholes for Locomotive Boilers, Webb's, 49
Fireproof Paint, 446
Fleet, Re-Armament of the, 45, 99, 119
Fleet at Spithead, Inspection of the, 465
Floating Derrick, A 100-ton, 371
Floating Docks, Maw's, for Fire Engines, 25
Floods, The Control of, 343
Flour Mills, Paris, 84
Fly-wheel, The, and its Associations, 207, 244, 318, 348, 364
Foreign and Colonial Notes, 6, 35, 50, 67, 86, 104, 118, 133, 153, 173, 190, 212, 228, 240, 262, 270, 287, 303, 326, 341, 367, 389, 412, 423, 444, 462
Foreign Foremen, Medals to, at the Vienna Exhibition, 83
Foreign Patent Laws, 466
Foundation Stone of Gunthorpe Bridge, Laying the, 368
Foundations, Cylinder, 78
Foundations, Details of, at the Vienna Exhibition, 279
Foundations, Heathorn's Subaqueous, 106
Fowler's, Mr. J., Report upon the Soudan Railway, 149, 176, 210
France, Irrigation in, 245
Francis Dynamometer, The, 239
French Canals, Steam Towage on, 354
French Electrical Instrument Factory, A, 393
French Gas Works for Small Towns, M. Le Perret's, 256
French Internal Navigation, 236, 354
French Railways *v.* American, 134
French Society of Civil Engineers, The, 125
Freiberg Mining Academy, 355
Fuel, Economy of, 286
Fuel, Powdered, 349
Furnace, Crampton's Coal-Dust, 294
Furnaces, Blast, Tuyeres for, 89
Future Shipping Legislation, 289, 321, 383

Garden Engine, Paget's, 8
Gas, the Kromschroder, 406
Gas Managers, The British Association of, 425, 445
Gas, A New, 93
Gas Works for Small Towns, M. Le Perret's, 256
Gauge-Glass Fittings, Webb's, 56
General Official Catalogue, The, at the Vienna Exhibition, 333
German Armour-Clad, The Borussia, 81
German Railway Rolling Stock and Coal Consumption, 236
Germany, Notes from, 22, 50, 55, 165, 199, 236, 264, 353
Glasgow Chair of Engineering, The, 206
Glycerine as an Anti-Incrustator, 94
Gold in Finland, 55
Goux's Absorbent Closet System, 258
Government Report on Sewage Utilisation in 1872, 404
Governor, The Allen, 317
Gramme Magneto-Electric Machine, The, 94, 192, 291
Gramme's Magneto-Electric Machine at Whieldon and Cooke's, 291
Greenwood, Thomas, Death of, 149
Grinding Rock Salt, Sauerbrey's Mill for, at the Vienna Exhibition, 375
Guano Company, The Native, 100, 137
Guebhard Counter, The, 154
Gunboats, Composite, 120, 140
Gun Carriage, Eads', with Pneumatic Elevating Gear, 5
Gun Factories, Defence of the Royal, 188
Gun, The First 35-ton, for the Devastation, 43
Gunpowder Pile Driver, The, 212
Guns and Armour, 78
Guns, Russian Naval, at the Vienna Exhibition, 414
Gunthorpe Bridge, Laying the Foundation Stone of, 368
Gwynne's Beam Pumping Engine, 314

Hahn's Air Pump for Raising Sewage at the Vienna Exhibition, 432
Hammer, The 35-Ton Steam, 206
Hammer, Steel Tilting, Thwaites and Carbutt's, at the Vienna Exhibition, 419
Hand Fire-engine, at the Vienna Exhibition, Reinhardt's, 301, 386
Harbour, Proposed Island, at Boulogne, Colonel A. Clarke's, 272
Harbour Works at Kurrachee, Inspection of the, 465
Harbour Works at Oamaru, New Zealand, 282
Head's Reversing Gear for 22-in. Plate Mill, 315
Heated Air Engine, Wenham's, 336
Heathorn's Subaqueous Foundations, 106
Heavy Artillery, Russian, at the Vienna Exhibition, 406
Heavy Pumping Machinery, 50
H.M.S. Devastation, The, 257
H.M.S. Devastation, Sir Spencer Robinson on the, 363
H.M.S. Devastation, Trial of, 273
H.M.S. Raleigh, The Launch of, 169
High Pressure Steam, on the Use of, 104
Hind's Slotting Machine, 398
Hind and Son's Wall Drilling Machine, at the Vienna Exhibition, 326
Historical Sketch of Dynamite, 53
History of Prices at the Vienna Exhibition, 29
Hoerde Iron Works, The, 199
Holmes's Apparatus for Driving Sewing Machines, 193
Holmes and Taylor's Brake and Starting Apparatus for Tramway Cars, 194
Horizontal Boring Machine, Constructed by the Chemnitzer Werkzeugmaschinen Fabrik, at the Vienna Exhibition, 361
Horizontal Engine, with Automatic Variable Expansion Gear, Sulzer's, 6
Hôtel de Ville, Paris, Reconstruction of the, 372
House of Commons Signal Light, The, 384, 442
Howard Boiler Explosion, The, 398, 431
Howard's Superheated Air Engine, 69
Hydraulic Apparatus for Closing Shops, 164
Hydraulic Chain Cable Shears, Fielding and Platt's, 287
Hydraulic Shears, Thompson, Boyd, and Co.'s, for Cutting 2½ in. Chain Cables, 287

Imperial Train on the Moscow and Koorsk Railway, 436
Increasing Temperature of the Earth, 264
India, Irrigation in, 70
Indian Railway Extensions, 92
India-rubber, Vulcanised, 199
Industry, The Sugar, 55
Inside the Rotunda of the Vienna Exhibition, 345
Inspection by Mr. Robertson of Kurrachee Harbour Works, 465
INSTITUTE, THE IRON AND STEEL:
Meeting in London, 305, 322
Address of the President, Mr. I. Lowthian Bell, 299, 312, 339, 370
On a Method of Preventing Shocks in Reversing Rolling Mills, by Mr. Jeremiah Head, 313
On Siemens' Direct Process for the Manufacture of Iron and Steel, by Dr. C. W. Siemens, 320
On the Recent Boiler Explosion at the Linthorpe Iron Works, Middlesbrough, by Mr. Jeremiah Head, 327
On the Combustion of Powdered Fuel in Revolving Furnaces, and its Application to Heating and Puddling Purposes, by Mr. T. R. Crampton, 349
Institute of Mining and Mechanical Engineers, The North of England, Address by the President, 108, 125, 131
Institute, The Franklin, Paper Read by S. Webber on the Francis Dynamometer, 239
Institution of Civil Engineers, Conversazione of the, 385
INSTITUTION OF CIVIL ENGINEERS, THE:
On the Practice and Results of Irrigation in Northern India, by Colonel W. H. Greathed, 70
On Cylindrical or Columnar Foundations in Concrete, Brickwork, and Stonework, by Mr. John Milroy, 78
On the Relative Advantages of the 5 ft. 6 in. Gauge, and of the Metre Gauge, for the State Railways of India, Particularly for those of the Punjab, by Mr. W. T. Thornton, 92
On the Mont Cenis Tunnel, by G. Sopwith, jun., 218
On the Rise and Progress of Steam Locomotion on Common Roads, by Mr. John F. Ed, 254
On the Rigi Railway, by Dr. W. Pole, 305
On the History of the River Clyde, by Mr. J. Deas, 326
On the Delta of the Danube, and the Provisional Works Executed at the Sulina Mouth, by Sir C. A. Hartley, 336
Institution of Civil Engineers, *v.* the Narrow Gauge, 403
INSTITUTION OF MECHANICAL ENGINEERS, THE:
On an Improved Apparatus for Working and Interlocking Railway Signals and Points, by W. Baines, 78
Anniversary Meeting at Birmingham, 79
On the Allen Governor for Steam Engines, by Mr. F. W. Kitson, 317
On Wenham's Heated Air Engine, by Mr. Conrad W. Cooke, 336
Institution of Naval Architects, The, and the Devastation, 257
Interior Navigation in France, 236, 354
Interior of the "Woolwich Infant," 103
Internal Navigation, French, 236 354
International Exhibition of 1873, The, 224, 243, 284, 394
International Exhibition, Webb's Steel Locomotive Boiler at the, 354
Inundations, The Control of, 343
Inventions, Regulations for the Protection of, at the Vienna Exhibition, 66
Inventions for Saving Life at Sea, 283, 397, 469
Inventions, Some Anticipated, 109
Iron Casting (Art Casting at the Vienna Exhibition), 426, 466
Ironclad "Borussia," The German, 61
Ironclads with Coal Tank Ends, 153, 205
Iron Foundry at Ilsenburg, Harz, Count Stolberg Wernigerode's, 426
Iron Industry in Australia, 124
Iron Ore, Spiegel, 363
Iron Trade Foremen's Association, The Cleveland, Special Meeting of, 480
Iron Trade, Manufactured, of Cleveland, 102
Iron Trade for 1872, The Scotch, 47
Ironwork at the Vienna Exhibition, Details of, 268
Iron Works, The Hoerde, 199
Irrigation in France, 245
Irrigation in India, 70
Irrigation in Italy, Contemporaneous, 37, 71, 111, 170, 186, 214
Island Harbour at Boulogne, Colonel Clarke's Proposed, 272
Italy, Contemporaneous Irrigation in, 37, 71, 111, 170, 186, 214

"James Spooner," The Fairlie Locomotive, 179
Japan, Engineering Progress in, 253
Japanese Suspension Bridge, 339
Joint-Stock Companies in Germany, Dividends of, 55
Journalists at the Vienna Exhibition, 346

Kitchen Railway Carriage for the Lower Silesian Railway, at the Vienna Exhibition, 449
Koorsk and Moscow Railway Imperial Train, 436
Kromschroder Gas, The, 406
Krupp's Proving and Experimental Ground, 255
Kurrachee Harbour, 465

Labour Legislation, 164
Lathe, Face, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 456
Lathe, Railway Wheel Turning, at the Vienna Exhibition, 479
Launch of Coke Ovens, The, 236
Launch of H.M.S. Raleigh, 169
Launches, Thorneycroft's Fast Steam, 165, 199
Law, Patent, Amendment Bill, 139
Lawrie and Da Costa's Sewer Traps, 94
Laws, Foreign Patent, 466
Laws, Patent, W. B. Adams upon the, 163
Leder's Tip Wagon, at the Vienna Exhibition, 453
Leeds Bridge, The New, 463
Legislation, Future, for Shipping, 289, 321, 383
Legislation, Labour, 164
Libotte Safety Catch, The, 55
Light, Effect of, on Selenium, 139
Light, Signal, for the House of Commons, 384, 442
Light, The Silber, 84
Linthorpe Iron Works, Middlesbrough, The Recent Boiler Explosion at, 327
Llynvi, Tondu, and Ogmore Iron Works, The, 461
Locking Gear for Points and Signals, 76
Locomotive Boiler, Webb's, Steel, at the International Exhibition, 354
Locomotive, Carels' Passenger, at the Vienna Exhibition, 459
Locomotive Engine Dimensions, Table of, at the Vienna Exhibition, 407
Locomotive for Iron Works, Tank, Constructed at the Harzer Iron Works, at the Vienna Exhibition, 452
Locomotive, The "James Spooner," 179
Locomotive, Nairn's Road, 228
Locomotive, Tank, at the Vienna Exhibition, 408
Locomotives at the Vienna Exhibition, 404, 427, 446, 467

Machine, The Gramme Magneto-Electric 94, 192, 291
Machine for Planing the Ends of Rails, Wagner's, at the Vienna Exhibition, 436
Machine, Plate-Bending, at the Vienna Exhibition, 432
Machine, Radial Drilling, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 376
Machine, Slot-Drilling and Boring, at the Vienna Exhibition, 473
Machine for Tyre-Drilling, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 451
Machinery, Agricultural, Trials of, at the Vienna Exhibition, 102, 229
Machinery, Bessemer, A Lecture on, at the Stevens Institute of Technology, 409
Machinery, Clayton's Peat, 248
Machinery Hall at the Vienna Exhibition, 79
Machinery Hall at the Vienna Exhibition for Agricultural Machinery, Regulations for Exhibits, 49
Machinery, Sugar, at the Vienna Exhibition, 347
Machines, Schone's Slotting and Nut-shaping, at the Vienna Exhibition, 380
Machines for Slag Cooling, Wood's, 167, 392
Madeira and Mamoré Railway, Rolling Stock for the, 239, 402, 463
Magneto-Electric Machine, Gramme's, 94, 192, 291
Main Line Railway, Tasmanian, Progress of the, 432
Making Gas from Mineral Oils, Sankow and Co.'s Apparatus for, at the Vienna Exhibition, 360
Malt-Drying, Apparatus for, at the Vienna Exhibition, 444
Manchester Society of Engineers, 136
Manchester Steam Users' Association, Annual Meeting of, 240
Mann's Railway Sleeping Cars, 265
Manufacture of Steel in France, The, 236
Manufactured Iron Trade of Cleveland, The, 102
Marine Engineering and Clyde Shipbuilding in 1873, 79, 135
Marine Engines at the Vienna Exhibition, 332
Marine Signals, Exhibition of, 306
Marten, Mr. E. B.'s Report on Boiler Explosions in 1872, 151, 169
Matching and Planing Machine, Richards's, 76
Maw's Floating Docks for Fire Engines, 25
MECHANICAL ENGINEERS, THE INSTITUTION OF:
On an Improved Apparatus for Working and Interlocking Railway Signals and Points, by W. Barnes, 78
Anniversary Meeting at Birmingham, 79
On the Allen Governor for Steam Engines, by Mr. F. W. Kitson, 317
On Wenham's Heated Air Engine, by Mr. Conrad W. Cooke, 336
Mechanical Forces, The, Operating on Studded Projectiles, 215
Mechanical Refinements, 66, 126
Mechanical and Scientific Society, Manchester, 18
Medals to Foreign Foremen at the Vienna Exhibition, 83
Medals and Premiums given by the Société d'Encouragement, 6
Medals, Prize, at the Vienna Exhibition, 392
Meeting, Anniversary, of the Institution of Mechanical Engineers at Birmingham, 79
Meeting, Annual, of the British Association Gas Managers, 425, 445
Memoir of the Late R. W. Thomson, 197
Metal Casting under Compression, 390
Metallurgy and Mining in Russia, 199
Metropolitan Railway, The, 62
Metropolitan Railways, Paris, 416

Mexican and South American Silver Ore, 165
Meyer v. Fairlie, 11, 139
Meyer v. Fairlie, Letters to the *Chroniques de l'Industrie*, 2, 134
Meyer's Multiple Telegraph, 199
Military Engineering, American, 307
Mill for Grinding Rock Salt, Sauerbrey's, at the Vienna Exhibition, 375
Mill (22-in. Plate), Head's Reversing Gear for, 315
Mills, Reversing Rolling, On a Method of Preventing Shocks in, 313
Mills, Rolling, 55
Mina Santa Gertrudes, Coquimbo, Turner's Winding Engines and Drums for the, 369
Mineral Oils, Suckow and Co.'s Apparatus for making Gas from, at the Vienna Exhibition, 360
Mines, The School of, 280
Mining Academy, Frieberg, 355
Mining Machinery, The Use of Compressed Air for Actuating, 27
Mining and Metallurgy in Russia, 190
Mining in Sweden, 194
Mont Cenis Tunnel, The, 218
Moscow and Koorsk Railway, Imperial Train for the, 456
Motion, Transmission of, 17
Moule's Earth-Closet System, 242
Movable Torpedoes, Captain Ericsson's, 107, 175
Moy and Shill's "Non-Radiating" Engine, 323
Multiple Telegraph, Meyer's, 199

Nairn's Road Locomotive, 228
Narrow Gauge v. the Institution of Civil Engineers, 402
Narrow Gauge Railways, Lieut.-Colonel J. P. Kennedy's Report on, 87
Narrow Gauge Railways, 84, 187, 241
Narrow Gauge Railways, Mr. R. F. Fairlie and Captain Tyler upon the, 114
Narrow Gauge Railways, Reports by J. Fowler and Carl Pihl, 95
Narrow Gauge Rolling Stock, 402, 463
Native Guano Company, The, 199, 137
Naval Architecture and Professor Rankine, 31
Naval Inspection at Spithead, 465
Navigation, Aerial, 22
Navy Estimates, The, 224
Navy, The United States, 66
New Gas, A, 93
Nile, Barrage across the, near Cairo, 25
Non-Condensing Beam Pumping Engine, J. and H. Gwynne's, 314
"Non-Radiating Engine," A, 323
Notes from Cleveland, 7, 97, 51, 62, 85, 106, 124, 130, 188, 174, 186, 203, 227, 245, 262, 268, 288, 310, 315, 341, 367, 400, 423, 450, 459
Notes, Foreign and Colonial, 6, 35, 59, 67, 86, 104, 118, 133, 158, 173, 190, 212, 228, 240, 262, 270, 287, 303, 326, 341, 367, 380, 412, 423, 444, 462
Notes from Germany, 22, 50, 65, 163, 199, 236, 264, 355
Notes from the North, 16, 35, 51, 67, 86, 105, 116, 135, 157, 174, 191, 211, 219, 246, 255, 270, 288, 303, 325, 340, 362, 380, 400, 423, 441, 461
Notes from Paris, 6, 22, 55, 94, 123, 164, 184, 199, 256, 280, 360
Notes on Sewage, 30
Notes from the South-West, 15, 35, 43, 68, 88, 105, 124, 135, 152, 174, 186, 211, 222, 240, 255, 269, 286, 300, 319, 341, 360, 377, 401, 423, 443, 462
Notes from South Yorkshire, 7, 27, 51, 68, 87, 105, 118, 138, 174, 191, 211, 219, 237, 255, 270, 288, 303, 325, 340, 362, 380, 400, 423, 441, 461
Norwegian Railways, 12
Nut-Shaping and Slotting Machines, Schone's, at the Vienna Exhibition, 335

Oamaru, New Zealand, Harbour Works at, 282
OBITUARY:
  Darwent, Mr., 6
  Elliot, F. H., 62
  Greenwood, Thomas, 148
  Le Bas, M., 59
  Poole, J., 15
  Rankine, W. J. Macquorn, 13
  Ritzinger, Peter Von, 355
  Rodger, J., 362
  Strobel, Major, 152
  Thomson, R. W., 182
Ocean Telegraphy, 427
Official Catalogue, The General, at the Vienna Exhibition, 233
Ogmore, Lyavi, and Tondu Iron Works, The, 461
Oil of Vitriol, 165
100-Ton Floating Derrick, A, 371
Opening of the Vienna Exhibition, 224
Ordnance at the Vienna Exhibition, No. I., The Russian Naval Guns, 414
Ore, Spiegel Iron, 263
Osterkamp's Rock Drill, 395

Paget's Garden Engine, 9
Paint, Fireproof, 446
Paint-street Bridge, Providence, U.S.A., 117, 202
Pantanemone, Sanderson's, 199
Paris Academy of Sciences, Papers Submitted to the, 128
Paris Flour Mills, 83
Paris Gas Company, Expenditure and Receipts of, 380
Paris Metropolitan Railways, 415
Paris, Notes from, 6, 22, 55, 94, 123, 164, 184, 199, 256, 280, 360
Paris, Reconstruction of the Hôtel de Ville a, 372
Paris, The Water Supply of, 19
Passenger Locomotive, Carel's, at the Vienna Exhibition, 452
Patent Law Amendment Bill, 139
Patent Laws, The, 162
Patent Laws, Foreign, 466
Patents, Recent, 16, 36
Paumben Ship Canal, The, 445
Pavillons and Annexes at the Vienna Exhibition, 366
Peat-Compressing Machinery, Clayton and Hewlett's, 356
Peat Machinery, Clayton's, 243
Pennsylvania Railroad, 395
Perkins's Road Steamer, 456
Perret's Gas Works for Small Towns, 246
Perth, The New Bridge at, 444
Peter von Rittinger, The Late, 355
Petroleum, Storing, 279
Pfaff, Fernau, and Co.'s Face Lathe, at the Vienna Exhibition, 456
Pfaff, Fernau, and Co.'s Radial Drilling Machine, at the Vienna Exhibition, 378
Phosphate Sewage Process, 46
Photometer, A New (Effect of Light on Selenium), 138
Pile-Driver, The Gunpowder, 212
Pile Foundations, Details of, at the Vienna Exhibition, 220
Planing and Matching Machine, Richards's, 76
Plant, American, for the Bessemer Process, 113
Plant, Brewing, at the Vienna Exhibition, 402
Plate-Bending Rolls at the Vienna Exhibition, 432
Plate Mill, 22-in., Head's Reversing Gear for, 315
Plating, Armour, 45, 99, 119, 153, 205
Plimsoll's, Mr., Mercantile Marine Bill, 223
Plumbago, Canadian, 124
Pneumatic Elevating Gear, Eads', for Gun Carriage, 5
Pneumatic Telegraph, The, 471
Points and Signals, Locking Gear for, 78
Pollit and Wigzell's Spring-Loaded Safety Valves for Marine Boilers, 95
"Pop" Safety Valve, Ashcroft's, 389
Port of Oamaru, New Zealand, Harbour Works at, 282
Portable Engine for Straw-Burning, Ransomes, Sims, and Head's, at the Vienna Exhibition, 357
Porter and Aveling's Road Roller, at the Vienna Exhibition, 310
Powder v. Dynamite, 22
Powdered Fuel, 349
Phosphate Sewage Process, The, 46
Prall's Water-Lifting Apparatus, 184
Prices at the Vienna Exhibition, The History of, 29
Prize Medals at the Vienna Exhibition, 332
Prize for Steel, 130
Professor Rankine and Naval Architecture, 31
Process, The A B C, 12
Process, The Bessemer, American Plant for, 113
Professor W. J. Macquorn Rankine, Death of, 13
Production of Cast-Iron in France during 1872, 236
Progress in Brazil, 227
Progress in Japan, Engineering, 253
Progress of Telegraphy in 1872, 156
Progress of the Vienna Exhibition, 273, 292, 308, 345, 363, 388
Projectiles, Studded, The Mechanical Forces Operating on, 215
Protection of Inventions at the Vienna Exhibition, Regulations for the, 66
Proving and Experimental Ground, Herr Krupp's, 355
Prussian Spiegeleisen, The Manufacture of, 22
Pump, Bernays' Centrifugal, 456
Pump, Sand, Employed in Australia, 6
Pumping Engine, Beam, J. and H. Gwynne's, 314
Pumping Engine at the Trimdon Grange Colliery, 6
Pumping Engines, Worthington, Reports upon the Tests of the, 411
Pumping Machinery, Heavy, 50
Pumps, Fire-engine, Reinhardt's, at the Vienna Exhibition, 301, 386
Punching and Shearing Machine, Wilder's, 40

Quadrant Electrometer, On the, 454
Quantitative Spectral Analysis, 260

Radial Drilling Machine, Pfaff, Fernau, and Co.'s, at the Vienna Exhibition, 378
Rail Economy, 38, 46, 463
Rail Ending Machine, Wagner's, at the Vienna Exhibition, 436
Rail Sections, Sandberg's, Tabular Statement of, 38, 39
Railroad, The Pennsylvania, 395
Railway Axle Box, Sloot's, at the Vienna Exhibition, 401
Railway Carriages, Austrian, 470
Railway Districts, 32
Railway Expedition, The Soudan, 146, 163, 185, 200, 225, 249, 275, 353
Railway Extensions, Indian, 92
Railway Kitchen Carriage for the Lower Silesian Railway, at the Vienna Exhibition, 443
Railway, The Metropolitan, 32
Railway, The Rigi, 303
Railway Rolling Stock and Coal Consumption, German, 236
Railway Sleeping Carriage for the Lower Silesian Railway, at the Vienna Exhibition, 361
Railway Sleeping Carriage for the North British Railway, 258
Railway Sleeping Carriages, 271
Railway Sleeping Cars, Mann's, 263
Railway, The Soudan, 63, 84, 146, 162, 183, 200, 225, 249, 275, 353
Railway, The Soudan, Report of Mr. J. Fowler, upon the, 149, 176, 210
Railway, Tasmanian Main Line, Progress of, 427
Railway Wheel Turning Lathe at the Vienna Exhibition, 473
Railway Wheels, Ludwig's, 460
Railways in Australia, 189
Railways, Narrow Gauge, 81, 187, 241
Railways, Narrow Gauge, Lieut.-Colonel J. P. Kennedy's Report on, 87
Railways, Narrow Gauge, Mr. R. F. Fairlie and Captain Tyler upon the, 114
Railways, Narrow Gauge, Reports by J. Fowler and Carl Pihl, 95
Railways, Norwegian, 12
Railways, Paris Metropolitan, 415
Railways, Swedish, their Cost, Gauge, and Speed, 142
Raising Sunken Ships, Taylor's Apparatus for, 247
Raising Sewage, Hahn's Air Pump for, at the Vienna Exhibition, 432
Raleigh, H.M.S., 169
Rankine, Professor, and Naval Architecture, 31
Rankine, W. J. Macquorn, Death of, 13
Ransome's Artificial Stone, 244
Ransome's Fire-proof Paint, 446
Ransomes, Sims, and Head's Straw-Burning Portable Engine, at the Vienna Exhibition, 357
Re-Armament of the Fleet, The, 45, 99, 119
Receipts and Expenditure of the Pennsylvania Railroad, 395
Recent Patents, 16, 36
Reconstruction of the Hôtel de Ville, Paris, The, 372
Record of Experiments Showing the Character and Position of Neutral Axes as Seen by Polarised Light, 54
Recording Steam Gauge, Edson's, 80
Refinements, Mechanical, 58, 128
Regulations, Custom House, for the Vienna Exhibition, 34
Regulations for Exhibits in the Agricultural Machinery Hall at the Vienna Exhibition, 49
Regulations for the Protection of Inventions at the Vienna Exhibition, 66
Regulator Valves, Coxhead and Miller's, for Compound Engines, 117
Regulators, Berryman's Feed, 73
Reinhardt's Fire Engines, at the Vienna Exhibition, 301, 386
Report, Colonel W. A. Roebling's, on the East River Bridge, 117, 134, 155, 198, 248, 264, 278, 296, 381, 424
Report of Mr. J. Fowler upon the Soudan Railway, 149, 176, 210
Report of the Swedish Board of Commerce upon Mining, 194
Reports by J. Fowler and Carl Pihl on Narrow Gauge Railways, 95
Reports upon the Tests of the Worthington Pumping Engine, 411
Resistance of Stones to Crushing, Experiments on the, 94
Retaining Walls, 267
Retrospect, Sanitary, of 1872, 63
Retrospect of Telegraphic Proceedings in 1872, 156
Reversing Gear for 22-in. Plate Mill, Head's, 315
Reversing Rolling Mills, on a Method of Preventing Shocks in, 313
Revolving Coal Screen, Walker and Cole's, 236
Richards's Planing and Matching Machine, 76
Rigi Railway, The, 303
Rittinger, Peter Von, The Late, 355
River Clyde, The, 326, 352
Road Locomotive, Nairn's, 228
Road Roller, Aveling and Porter's, at the Vienna Exhibition, 310
Road Steamer, Perkin's, 456
Roads, Steam on Common, 254, 278, 295
Robinson, Sir Spencer, on H.M.S. Devastation, 363
Rock Drill, Osterkamp's, 395
Rock Salt, Sauerbrey's Mill for Grinding, at the Vienna Exhibition, 375
Rolling Mill Engine, Englerth and Cunzer's, at the Vienna Exhibition, 457
Rolling Mills, 55
Rolling Stock for the Maderia and Mamord Railway, 229, 402, 463
Rolling Stock, Narrow Gauge, 402, 463
Rolls, Plate-bending, at the Vienna Exhibition, 432
Rope Tramway near Vienna, 22
Rotunda of the Vienna Exhibition, in the, 345
Rouxqueyrol-Denayrrouz's, MM., Diving Dress, at the Vienna Exhibition, 339
Royal Gun Factories, Defence of the, 188
Royal Society, Annual Soirée of the, 307
Royal United Service Institution, Paper on Bow and Stern Screw Ships, 452
Russian Heavy Artillery, at the Vienna Exhibition, 406
Russian Imperial Train, The Moscow and Koorsk Railway, 456
Russian Naval Guns, at the Vienna Exhibition, 414

Safety Catch, The Libotte, 55
Safety Valve, Ashcroft's "Pop," 389
Safety Valves, Spring-loaded, Pollit and Wigzell's, for Marine Boilers, 95
Sand Pump Employed in Australia, 6
Sandberg's Standard Rail Sections, Tabular Statement of, 38, 39
Sanderson's Pantanemone, 199
Sanitary Retrospect of 1872, 63
Sauerbrey's Mill for Grinding Rock Salt at the Vienna Exhibition, 375
Saving Life at Sea, Inventions for, 283, 397, 469
Scaffolding at the Vienna Exhibition, 389
School of Mines, The, 280
Schone's Slotting and Nut-shaping Machines, at the Vienna Exhibition, 335
Scientific and Mechanical Society, Manchester, 18
Scotch Iron Trade, The, for 1872, 47
Screen, Adjustable, Briart's, for Screening Coal, 52
Screen, Revolving Coal, Walker and Cole's, 236
Selenium, Effect of Light on, 138
Sewage, Hahn's Air Pump for Raising, at the Vienna Exhibition, 432
Sewage, Notes on 30
Sewage Process, The Phosphate, 46
Sewage Utilisation in 1872, 404
Sewer Traps, Da Costa and Lawrie's, 94
Sewing Machines, Holmes's Apparatus for Driving, 133
Shearing Machine, Wagner's Duplex Bloom, at the Vienna Exhibition, 460
Shearing and Punching Machine, Wilder's, 40
Shears, Hydraulic, Thompson, Boyd, and Co.'s, for Cutting 2½-in. Chain Cables, 287
Shill and Moy's "Non-radiating" Engine, 323
Ship Canal, The Darien, 275
Ship Canal, The Paumben, 445
Shipping Legislation, Future, 289, 321, 383
Siemens' Direct Process for the Manufacture of Iron and Steel, 329
Siemens, Dr., on the Manufacture of Iron at the Chemical Society, 217
Signal Light, Whieldon and Cooke's, for the Westminster Clock Tower, 384, 412
Signalling, Train, 48, 93
Signals, Distress, 206
Silver Light, The, 84
Silver Ore, Mexican and South American, 165
Sir Spencer Robinson on H.M.S. Devastation, 363
Sir William Armstrong's Address to the North of England Institute of Mining and Mechanical Engineers, 108
Six-wheel Coupled Passenger Locomotive, Carels', at the Vienna Exhibition, 459
Slag Cooling Machines, Wood's, 167, 262
Slag, The Utilisation of, 170
Sleeping Carriage for the Lower Silesian Railway, at the Vienna Exhibition, 361
Sleeping Carriage for the North British Railway, 258
Sleeping Carriages, Railway, 271
Sleeping Cars for Railways, Mann's, 263
Sloot's Railway Axle-box, at the Vienna Exhibition, 401
Slot-drilling and Boring Machine, at the Vienna Exhibition, 472
Slotting Machine, Hind's, 398
Slotting and Nut-shaping Machines, Schone's, at the Vienna Exhibition, 335
Smith's Metal Casting under Compression, 389
Société d'Encouragement, The, 6
Society, The Chemical, 217
Society of Civil Engineers, The French, 125
Society of Engineers, Manchester, 126
Society, The Royal, Annual Soirée of, 307
Sone Canals, The, 179, 213, 373
Soudan Railway, The, 63, 84
Soudan Railway Expedition, The, 63, 84, 146, 163, 185, 200, 225, 249, 275, 353
Soudan Railway, Report of Mr. J. Fowler upon the, 149, 176, 210
South-West, Notes from the, 15, 35, 43, 68, 88, 105, 124, 135, 152, 174, 186, 211, 222, 240, 255, 269, 286, 300, 319, 341, 360, 377, 401, 423, 443, 462
South Yorkshire, Notes from, 7, 27, 51, 68, 87, 105, 118, 138, 174, 191, 211, 219, 237, 255, 270, 288, 310, 317, 341, 367, 381, 399, 423, 443, 462
Special Meeting of the Cleveland Iron Trade Foremen's Association, 380
Spectral Analysis, Quantitative, 260
Spiegel Iron Ore, 263
Spiegeleisen, The Manufacture of, 22
Spithead, The Fleet at, 465
Spring-Loaded Safety Valves, Pollit and Wigzell's, for Marine Boilers, 95
Starting and Brake Apparatus, Holmes and Taylor's, for Tramway Cars, 194
Stationary Engines at the Vienna Exhibition, No. I, 415; No. II., 437; No. III., 453
Steam Crane, Appleby's, at the Vienna Exhibition, 459
Steam on Common Roads, 254, 278, 295
Steam Engine Economy, 122, 140, 154, 258, 280
Steam Gauge, Edson's Recording, 90
Steam Hammer, The 35-ton, 206
Steam, High Pressure, On the Use of, 104
Steam Launches, Thorneycroft's Fast, 163, 199
Steam-Moved Street Cars, 237
Steam Users' Association, Manchester, Annual Meeting of, 240
Steam-Worked Tramways, 15, 237
Steamer, Perkin's Road, 456
Steamship Atlantic, Wreck of the, 273
Steamship Feyoume, Engines of the, 333
Steel and Chilled Shells, Austrian Experiments on, 132, 149
STEEL AND IRON INSTITUTE, The:
  Meeting in London, 305, 322
  Address of the President, Mr. I. Lowthian Bell, 290, 312, 329, 370
  On a Method of Preventing Shocks in Reversing Rolling Mills, by Mr. Jeremiah Head, 313
  On Siemens' Direct Process for the Manufacture of Iron and Steel, by Dr. C. W. Siemens, 329
  On the Recent Boiler Explosion at the Linthorpe Iron Works, Middlesbrough, by Mr. Jeremiah Head, 327
  On the Combustion of Powdered Fuel in Revolving Furnaces, and its Application to Heating and Puddling Purposes, by Mr. T. R. Crampton, 349
Steel Locomotive Boiler, Webb's, at the International Exhibition, 334
Steel, The Manufacture of, in France, 236
Steel, Prize for, 130
Steel Tilting Hammer, Thwaites and Carbutt's, at the Vienna Exhibition, 419

Stern and Bow Screw Ship, 452
Stevens Institute of Technology, A Lecture on Bessemer Machinery at, 113, 409
Stock, Narrow Gauge Rolling, 402
Stock, Rolling, for the Madeira and Mamoré Railway, 229, 402, 463
Stone, Artificial, in Rhineland, 264
Stone, Ransome's Artificial, 244
Storing Petroleum, 279
Strains on Swing Bridge at Providence, U.S.A., 117, 202
Straw-Burning Portable Engine, Ransomes, Sims, and Head's, at the Vienna Exhibition, 557
Street Cars, Steam-Moved, 15, 287
Studded Projectiles, The Mechanical Forces Operating on, 215
Subaqueous Foundations, Heathorn's, 106
Submarine Cable, The Brazilian, 384
Submarine Cable, The Vitality of a, 425
Substitutes for Armour, 45, 99, 119, 153, 205
Suckow and Co.'s Apparatus for Making Gas from Mineral Oils, at the Vienna Exhibition, 360
Sugar, French, Notes on Third-Class Raw, 236
Sugar Industry, The, 55
Sugar Machinery at the Vienna Exhibition, 347
Sulphuric Acid, Concentration of, 22
Sulzer Engine, The, 9, 33
Sulzer Engine Trials at Augsberg, 41, 58, 74
Sunken Ships, Taylor's, Apparatus for Raising, 247
Superheated Air Engine, The Howard, 69
Supply of Water for Paris, 19
Suresnes, The Bridge of, 199
Suspension Bridge, Japanese, 339
Sweden, Mining in, 194
Swedish Railways, their Cost, Gauge, and Speed, 142
Swing Bridge at Paint-street, Providence, U.S.A., 117, 202
Swiss Catalogue, The, at the Vienna Exhibition, 385

Table, Clayton's Brick Cutting, 246
Table of Dimensions of Locomotive Engines at the Vienna Exhibition, 407
Table Showing the Number of Exhibitors at the Vienna Exhibition, 333
Tabular Statement of Sandberg's Rail Sections, 38, 39
Tank Ends, Coal, for Ironclads, 153, 205
Tank Locomotive at the Vienna Exhibition, 468
Tank Locomotive for Iron Works, Constructed at the Harzer Iron Works, at the Vienna Exhibition, 457
Tank Locomotive, Wohlert's, for the Upper Silesian Railway, at the Vienna Exhibition, 422
Tasmanian Main Line Railway, Progress of the, 432
Taylor's Apparatus for Raising Sunken Ships, 247
Telegraph, The Pneumatic, 471
Telegraphy in 1872, 156
Telegraphy, Atlantic, 344
Telegraphy, Ocean, 497
Telemeters, 2, 19, 53, 71, 89, 110, 145, 171, 178, 196, 233, 250, 281, 311
Temperature of the Earth, Increasing, 264
Test of Time, The, 293
Thermodynamics, 22
35-ton Steam Hammer, The, 206
Thomas Greenwood, Death of, 148
Thompson, Boyd, and Co.'s Hydraulic Shears for Cutting 2½-in. Chain Cables, 287
Thomson, H. W., The Late, 182
Thorneycroft's Fast Steam Launches, 165, 199
Thwaite's and Carbutt's Steel Tilting Hammer, at the Vienna Exhibition, 419
Time, The Test of, 293
Tip Wagons, Leder's, at the Vienna Exhibition, 433
Tondu, Llynvi, and Ogmore Iron Works, The, 461
Torpedo, Captain Ericsson's Letter to the Secretary of the United States Navy, 26
Torpedoes, Movable, Captain Ericsson's, 107
Traction on Canals, 354
Train Communication, Colonel Binney's System, 48, 93
Tramway Cars, Holmes and Taylor's, Brake and Starting Apparatus for, 194
Tramway, Hope, near Vienna, 22
Tramways, Steam-Worked, 15
Transept, Entrance to, at the Vienna Exhibition, 43
Transmission of Motion, 17
Transport of the 12-in. 40-ton Russian Gun from Aboukow, to the Vienna Exhibition, 406
Traps, Sewer, Da Costa and Lawrie's, 94
Trial of the City of Aberdeen, 442
Trial of H.M.S. Devastation, 272
Trials of Agricultural Machinery at the Vienna Exhibition, 102, 229
Trials of the Sulzer Engine at Augsberg, 41, 58, 74
Trimdon Grange Colliery, Pumping Engine at the, 6
Tube Wells, 199
Tunnel, The Mont Cenis, 218
Tunnels, Ventilating, 50
Turner's Winding Engines and Drums for the Mina Santa Gertrudes, Coquimbo, 369
Tuyeres for Blast Furnaces, 89
Tyre-Drilling Machine, Constructed by the Sächsische Maschinenfabrik zu Chemnitz, at the Vienna Exhibition, 451

United States Navy, The, 98
United States Section at the Vienna Exhibition, 316
Upper Silesian Railway, Wohlert's Tank Locomotive for the, at the Vienna Exhibition, 422
Utilisation of Sewage in 1872, 494
Utilisation of Slag, The, 170

Ventilating Tunnels, 50
VIENNA EXHIBITION, THE:
Agricultural Engines, 448
Art Castings, 426, 466
British Commission, The, 316
Count Stalberg Wernigerode's Iron Foundry, at Ilsenburg, Harz, 426
Covered Garden Courts, 390
Covered Ways, 390
Custom House Regulations, 34
General Description of Buildings, I. 1; II., 57; III., 137; IV., 159; V., 177; VI., 185; VII., 231; VIII., 260; IX., 263; X., 280; XI., 297; XII., 331; XIII., 353
General Official Catalogue, The, 333
History of Prices, 29
Locomotives, 404, 427, 446, 467
Marine Engines, 332
Opening of the Vienna Exhibition, 394
Ordnance: Russian Naval Guns, 414
Pavilions and Annexes, 346
Prize Medals at Vienna, 332
Prizes for Foreign Foremen, 83
Progress of the Exhibition, 273, 292, 308, 315, 365, 389
Regulations for Admission to the Exhibition, 310
Regulations for Exhibits in the Machinery Hall, 49
Regulations for the Protection of Inventions, 66, 247
Rotunda, In the, 345
Russian Heavy Artillery, 406, 414
Stationary Engines, 418, 437, 453
Straw-Burning Portable Engine, 557
Sugar Machinery, 347
Swiss Catalogue, The, 385
Table Showing the Number of Exhibitors in the Various Groups, 333
Transport of the 12 in. 40-ton Russian Gun from Aboukow to the Vienna Exhibition, 406
Trials of Agricultural Machinery, 102, 229
United States Section, 316
Vienna Water Works, The, 387
Vitality, The, of a Submarine Cable, 425
Vitriol, Oil of, 165
Vulcanised India-Rubber, 199

Wagner's Duplex Bloom Shearing Machine, at the Vienna Exhibition, 469
Wagner's Machine for Planing the Ends of Rails, at the Vienna Exhibition, 438
Wagon, Leder's Tip, at the Vienna Exhibition, 433
Walker and Col's New Revolving Coal Screen, 236
Wall-Drilling Machine, Hirst and Son's, at the Vienna Exhibition, 326
Walls, Retaining, 287
Wannieck's Corliss Engine, 375
Water Firebar, Ellis's, 312
Water Heater, Berryman's Feed, 124
Water-Lifting Apparatus, Frali's, 184
Water Supply of Brussels, 236
Water Supply of Paris, The, 19
Water Works, Charcoal Filtration for, 470
Water Works, The Vienna, 387
Ways at the Vienna Exhibition, Covered, 390
Webb's Fireholes for Locomotive Boilers, 49
Webb's Gauge Glass Fittings, 36
Webb's Steel Locomotive Boiler at the International Exhibition, 334
Webber, S., on the Francis Dynamometer, at the Franklin Institute, 239
Wells, Tube, 199
Wenham's Heated Air Engine, 356
Westinghouse Air Brake, The, 119
Westminster Clock Tower, Whieldon and Cooke's Signal Light for, 284, 442
Wheel-Turning Lathe, at the Vienna Exhibition, 473
Wheels, Ludwig's Railway, 400
Whieldon and Cooke's Signal Light for the Westminster Clock Tower, 284, 442
Wilder's Punching and Shearing Machine, 40
Winding Engine and Drums, Turner's, for the Mina Santa Gertrudes, Coquimbo, 369
Wohlert's Locomotive Tank for the Upper Silesian Railway, at the Vienna Exhibition, 422
Wood's Slag Machines at the Tees Iron Works, Middlesbrough, 167, 252
"Woolwich Infant," The Late, 163
Works, The Admiralty, Directorship of, 426
Worthington Pumping Engines, Reports upon the Tests of the, 411
Wreck of the Atlantic, The, 273

PARAGRAPHS.

ABERCARNE Coal Company, Newport, Arrangements of the, 377
Abercarne, Meeting of Steam-Coal Colliers at, 341
Abercorn Tin Works, 15
Aberdare, Commencement of a New Colliery at, 105
Aberdare Harbour Board, Engineer's Annual Report, 35
Aberdare Valley Collieries, The, 462
Aberdeen Harbour Engineer, Salary of the, 51
Aberdeen Harbour Works, Progress of the, 400
Aberaychan and Pontypool, Labour at, 309
Abertillery Tin Works, South Wales, Progress of the, 269, 423
Address, Inaugural, of the North British Association of Gas Managers, 421
Address to Mr. J. Brogden at Tondu, South Wales, on his Return from New Zealand, 105
Adelaide and Glenelg Railway Extension, 451
Adelaide, Glenelg, and Suburban Railways, Meeting of Shareholders, 95
Advance of the Price of Gas in Scotland, 423
Advance of Wages, Boickow, Vaughan, and Co.'s, Middlesbrough, Application for, 315, 367
African Steam Gauge, An, 55
Agitation of Brassworkers at Rotherham, 105, 138, 288
Air Gas, Wright's Patent, Exhibition of, 237
Alaska, Discovery of Quartz in, 136
Albert Graving Dock, Victoria, Progress of, 363
Algeria, Loss on Railways in, 336
Algerian Minerals, 444
Alicante, Saragossa, and Madrid Railway, Progress of the, 462
Allan Line of Steamers, Subsidy Granted to from the Canadian Government, 314
Alterations of Works, &c., in the Sheffield Districts, 27, 87, 105, 174, 219, 235, 367, 381, 399, 423, 443
Alton and Chicago Railroad, Progress of the, 240
Amalgamation, Proposed, of British Australian and Trans-Indian Telegraph Companies, 105
Ambulance Railway Carriage, Trial of, 88
America, Sheffield Work in, 27
American Bridge Building, 423
American Fires, Money Lost by, 133
American Locomotive Building, 270
American Locomotives in Russia, 228
American Patents, 35
American Petroleum, Yearly Export of, 158
American Rail Imports, 35
American Railroad Bridge, 18
American Rolling Mill, A New, 423
American Small Arms, 118
American Steam Navigation, Progress of, 228, 326, 462
American Steamship Company, Progress of the, 266
American Travel, Proposed Arrangements for, 341
American Water Works, 212
Anderson's University, Glasgow; Lectureship on Applied Mechanics, 16
Andes, Survey for Railway across the, 444
Annual Consumption of Gas in New York, The, 412
Annual Report of J. Brown and Co., Atlas Works, Sheffield, 443
Annual Report of C. Cammell and Co., Cyclops Works, Sheffield, 443
Annual Report of the Parkgate Iron Company, 381
Annual Report of the Sheffield Water Works Company, 270
Anstruther Harbour Works, Progress of the, 362
Anthracite Coal, Increase in the Production of, 259
Apparatus for Rock-Cutting, Major Beaumont's, Inspection of, 148
Appointment to the Japanese Engineering Colleges, 270
Arbroath Harbour Improvements, 105
Argentine Railways, Progress of, 103, 174, 219, 266, 303, 400, 450
Argentine Republic, Locomotion in the, 400
Argentine Steam Navigation, 341
Ascent of Cotopaxi by Dr. Reiss, 367
Asiatic, s.s., Trial of the, 105
Association of Engineers in Glasgow, 51, 191
Association of Gas Managers, West of Scotland, Meeting of, 212
Atlantic Steamship Company, South Wales, Cork Mattresses for the, 240
Auckland Iron Company, Winding up of the, 426
Auckland, Public Works in, 15
Australia, Bessemer Works in, 76
Australia, Western, Progress in, 402, 444
Australian Lighthouse, Proposed New, 116
Australian Overland Telegraph, Commemoration of the Opening, 126
Australian Overland Telegraph and the House of Assembly, 158
Australian Railway, A Cheap, 262
Australian Railways, Progress of, 35, 104, 223, 368, 451
Australian Telegraphy, Progress of, 35, 86, 105, 126, 158, 178, 270, 412
Australian Trans-Continental Railway, An, 191, 228, 270
Automatic Chromatic Top, 8
Avon Intercepting Sewer, The, 443
Avonmouth Docks, Progress of the, 225, 300, 390
Avonside Engine Company, Report of the, 240
Ayrshire Agricultural Show, Marsden's Steam Road Metal Crusher at, 325
Ayrshire, Termination of Miners' Strike in, 86
Azoff Coal Company, Prospectus of the, 262

Bagdad and Ismidt Railway, 118
Baldwin Locomotive Works, Philadelphia, 314, 367, 390
Ballarat, Banquet at, on the Completion of Victorian Locomotives, 444
Ballot at the Institution of Civil Engineers, 338
Baltimore Bridge Company, 108
Baltimore and Ohio Railroad, Iron and Steel Used in Repairing the, 103
Barclay's Dock, Purchase of, by the Clyde Trust, 362
Barnsley, Increased Price of Gas at, 174
Barnsley, Reduction in the Price of Coal at, 341
Bateman, Mr., at Buenos Ayres, 30, 95, 269, 341, 423
Bathgate and West Calder, New Railway between, 340
Bay and River, Delaware, Proposed Improvement of the, 424
Belgian Coal Trade, The, 158, 285, 376, 398, 423, 444
Belgian and French Mechanical Industry, 240
Belgian Iron, Exports of, 6
Belgian Iron, Official Returns of the Quantity Exported, 104
Belgian Iron Trade, The, 67, 118, 188
Belgian Metallurgy, 86, 312
Belgian Rails, 174, 238, 287, 326
Belgian Rails in Victoria, 175, 326
Belgian State Railways, Official Report on, 339
Belgium, Danka's Furnace in, 85
Berkeley and Gloucester Canal, Progress of the, 319
Berwick-on-Tweed, New Dock for, 51
Bessemer Works in Australia, 76
Beuther's Oil Axle-Box, Company formed for the Purchase of, 326
Bill, Passing of, for Chilian Telegraphs, 53
Black Sea, Russia in the, 396
Black Vein Steam Coal Company, Newport-Abercarne, 222, 377, 401
Blackwood, A New Colliery at, 341
Blaenavon, Resumption of Work at, 286
Blast Furnace and Colliery, A New, at Cudworth, near Barnsley, 288
Blast Furnace Men of the North of England and their Wages, 203, 227, 245, 262, 283
Blast Furnace, A New, at Blaenavon, 401
Blast Furnace Slag, Utilisation of the, 288
Blast Furnaces, New, in the North of England, 27
Blast Furnaces, Scotch, 51, 115, 205
Blast Furnaces, Tees Bridge, Increase of, 288
Blochairn Iron Works, Scotland, Disposal of the, 380
Block System, The, on the Caledonian and North British Railways, 303
Blower, Roots's Patent, Large Orders for, 87
Board of Arbitration, North of England, Meeting of, 51, 86
Board of Trade, Marine Department of, Appointment of the Honourable Digby Murray, 108
Boiler Explosion at South Stockton, 315
Boiler Inspection in the United States, 412
Boiler and Pipe, Patent, Foundry Company, 73
Bolt, Nut, Cut Nail, and Wire Trades, Middlesbrough, Progress of the, 195
Bombay, Baroda, and Central India Railway, The, 403
Bonded Debt, The, of Chicago, 6
Boring Machine, A Queensland, 219
Bosnia, Discovery of a Sulphur Mine in, 360

Bosnia, Survey for Railways in, 130
Boston, Great Progress in Rebuilding, 159
Boston, Plan for the Rebuilding of, 236
Boulogne Harbour, 304
Brassworkers at Rotherham, Agitation of, 105, 156, 286
Brazil, Bridges in, 106
Brazil, Explorations for Coal in, 50
Brazilian Navy, Expenses of the, 50
Brazilian Ocean Telegraphy, 95
Brazilian Railways, 51, 104, 201, 335
Brazilian Submarine Cable Company, The, 444
Brazilian Telegraphy, 400
Breakwater, Proposed, at Fraserburgh, 16
Breakwater, Wick, 174
Breakwaters, Victorian, 162
Brecon and Merthyr Railway, The, 69, 124, 423
Brecon and Neath Railway Company and Neath Harbour, 152
Bridge, Another over the Schuylkill, 262
Bridge, The Buffalo, Progress of, 341
Bridge Building, American, 423
Bridge, Completion of, at Queensland, 246
Bridge Designs, The Navy, Decision of the Commission, 423
Bridge, The Girard Avenue, Completion of the, 328
Bridge, New Suspension, over the River Esk, 256
Bridge, Proposed New, at Swindon, 142
Bridge, Railway, across the Maritza River, Turkey, 345
Bridge, Railway, over the River Forth, Parliamentary Sanction for, 330
Bridge, The Tay, Progress of, 116
Bridge, The Tyne, Progress of, 62
Bridge, The Wellington, Leeds, Dimensions of, 87
Bridges, American Railroad, 18
Bridges in Brazil, 106
Brighton, Proposed New Railway from, 314
Bristol Bridge, Widening of, 423
Bristol Channel Docks, Progress of, 86, 240
Bristol, Customs and Port Dues at the Docks, 401
Bristol Docks Committee, Election of Chairman for the, 43
Bristol Docks, Revenue of the, 68
Bristol and Exeter Railway Company and the Gauge Question, 152
Bristol and New York Steamers, Contract for, 105
Bristol and Portishead Railway, Pier and Dock Company, Half-Yearly Meeting of the, 174
Bristol, Proposed Increase in Wharf Accommodation at, 53
Bristol River Improvements, 135
Bristol and Somerset Railway, Progress of the, 15, 35, 88, 269, 360
Bristol and South Wales Wagon Company, Dividend of the, 105
Bristol Tramways, Progress of, 43, 105, 462
Bristol United Gaslight Company, Meeting of the, 211
Bristol Water Works Company, Meeting of the, 186
British American Lighthouses, Number of, 368
British Columbia, Dimensions of, 352
Briton Ferry Ironworks, Progress of, 68
Broadway, New York, Proposed Widening of, 368
Brogden, Mr., and his Collieries, 462
Brogden, Mr. J., Return of, to South Wales, 105
Bronze Statue of Sir J. Outram, 461
Brooks Locomotive Works, New York, Number of Men Employed at, 270
Brousse and Moudania Railway, Inauguration of the, 368
Brown, J., and Co.'s Works, Sheffield, Dispute at, 68, 118
Buenos Ayres, Mr. Bateman at, 50, 95, 269, 341, 423
Buenos Ayres, A Mole Proposed for, 341
Buenos Ayres, Sewerage in, 190
Buffalo Bridge, Progress of the, 341
Buildings in Montreal, Increase of, 86
Buildings, The Ventilation of, 459
Burntisland Dock Works, The, 51
Bute Docks, Goods Imported into, 105, 186
Bute Docks, Strike at the, 341

Caerphilly Colliery Company, 15
Caithness and Sutherland Railway, Progress of the, 288
Caledonian and North British Railways, The System on the, 303
Cammell and Wilson's Works, near Sheffield, 7, 117, 370
Canada, Central Railway, Extension of the, 7
Canada, Grand Trunk Railway of, Appointment of Mr. J. Melville, 86
Canada, Northern, Extension Railways, 270
Canadian Bridge, Completion of a Great, 444
Canadian Canals, Progress of, 86
Canadian Cities and Towns, Population of, 228
Canadian Enterprise, 192, 267
Canadian Inland Navigation Company, Annual Meeting of the, 158
Canadian Iron Ore, 174
Canadian Iron Ore, Exhibition of Specimens, 158
Canadian Ironstone, 7
Canadian Lighthouses, 462
Canadian Mechanical Industry, 462
Canadian Minerals, 212
Canadian Pacific Railway, Proposed Contract for, 175
Canadian Patent Office Publications, 248
Canadian Railways, Progress of, 7, 43, 54, 118, 133, 173, 228, 270, 288, 341, 444
Canal, The Darien Ship, 59
Canal, The Erie, Proposed Enlargement of, 10
Canal, The Glamorgan, Proposed Introduction of Steam Power on, 224
Canal, The Gloucester and Berkeley, Progress of the, 319
Canal, The Grenville, Progress of the, 7
Canal, The James River, Plan for the Completion of, 15
Canal, A New French, 50
Canal, The Suez, 130, 240, 266, 270
Canal, The Welland, Engineers' Report of, 212
Canal, The Welland, Inspection of, 105
Canals, Canadian, Progress of, 86
Canals, New York, Statistical Return of the, 190
Canterbury, New Zealand, Extension of Railways in, 86
Cape Breton Coal, Discovery of a Fresh Seam, 228
Cappielow Sugar Refinery, Greenock, Progress of, 270
Cardiff Coal and Coke Trade, 43, 240, 255, 260, 286
Cardiff Docks and the Steam-Coal Shippers, 360
Cardiff, New Railway Station for, 377
Cardiff, Port of, Quantity of Coal Exported from, 255
Cardiff and Swansea Steam Coal Company, The, 443
Cardiff, Trade at, 68, 269, 377
Cardiff Tramways, 68
Cardiff, Visit of the Tyne Commissioners to, 377
Carmichael, The Late Mr. J., of Dundee, Statue, of, 16
Cassaba and Smyrna Railway, Extension of the, 303
Casting, Large, at the Abercorn Foundry Company, Paisley, 461
Casting, A Large, at Kirkstall Forge, 462
Cattle Market, New, for Dundee, 16
Ceinture Railway of Paris, Receipts of the, 473
Central Pacific Railroad, Receipts of the, 105
Central Pacific Railroad, Traffic on the, 240
Central Railroad of New Jersey, Number of Locomotives on the, 241
Chamber of Commerce, Sheffield, Meeting of, 87
Chamber of Commerce, Southampton, and Railway Communication, 377
Charentes Railway, Progress of the, 288
Charter, Proposed, for the Canadian Pacific Railway, 54
Châtillon and Commentry Forges Company, Profits of the, 462
Cheap Australian Railway, A, 262
Cheap Indian Railways, 412
Chemical Company, Sheffield, Formation of a, 310
Chesapeake and Ohio Railroad, Progress of the, 105, 174
Cheviot, Steamship, Sale of the, 377
Chicago and Alton Railroad, Progress of the, 240
Chicago, The Bonded Debt of, 6
Chicago Water Works, Progress of the, 412
Chili and the Gauge Question, 50
Chili, Railways in, 15
Chili, Telegraphs in, 15
Chilian Railways, Progress of, 182
Cities and Towns, Canadian, Population of, 228
City Engineer and Surveyor for Norwich, Appointment of, 165
Civil Engineers, The Institution of, 36, 39, 106, 168, 236, 262, 317, 358, 368
Civil and Mechanical Engineers' Society, The, 27, 401, 434
Clayton v. Murray, Confirmation of Judgment, 183
Clayton's Peat Machinery, 381
Cleveland Coal and Coke Trades, 7, 51, 62, 86, 106, 124, 130, 158, 174, 186, 203, 227, 245, 268, 310, 341, 367, 400, 450, 459
Cleveland Engineering, 7, 51, 86, 124, 130, 158, 186, 268, 310, 341, 400, 423, 459
Cleveland Iron Market, The, 7, 400, 423, 450, 459
Cleveland Iron Trade, 27, 51, 62, 86, 106, 124, 130, 158, 174, 186, 203, 227, 247, 262, 268, 288, 310, 315, 341, 367, 400
Cleveland Iron Trade, Great Crisis in the, 367
Cleveland Iron Trade, Prospects of the, 400
Cleveland Iron Trade, Quarterly Meeting of the 27
Cleveland Ironfounding, 130
Cleveland Ironmasters' Association, Returns of the, 27, 262, 315, 423
Cleveland Ironstone, Advance in the Price of, 86
Cleveland Ironstone Miners, The, 7, 27, 51, 186, 203, 227, 245, 268, 288, 310, 315, 341, 400, 423, 450, 459
Cleveland Ironstone Miners and the Proposed Board of Arbitration, 268
Cleveland Mine Owners and their Men, 288
Cleveland Shipbuilding, 7, 51, 86, 124, 130, 158, 186, 203, 245, 268, 130, 341, 400, 423, 459
Cleveland, Stoppage of Works in, 423
Clyde Shipbuilder, Honour to a, 340
Clyde Subway Bill, Rejection of the, 246
Clyde Trust, Engineer's Quarterly Report, 35
Clyde Trust, Important Purchase by the, 362
Clyde Trust and Messrs. Elder and Company's Wet Dock at Fairfield, 105
Clyde Trust, Meeting of the, 400
Coal, Advance in the Price of, at Sheffield, 7, 105, 118, 174
Coal at Barnsley, Reduction in the Price of, 341
Coal Basin, The Ruhr, Germany, Production of, 50, 86
Coal, Belgian, Exports of, 158
Coal, Cape Breton, Discovery of a Fresh Seam, 228
Coal and Coke on the Great Western Railway, Half-yearly Cost of, 255
Coal and Coke Trade, The, at Cardiff, 43, 240, 255, 260, 286
Coal and Coke Trade, The Cleveland, 7, 51, 62, 86, 106, 124, 130, 158, 174, 186, 203, 227, 245, 268, 310, 341, 367, 400, 450, 459
Coal Company, Prospectus of the Anoff, 262
Coal Company, Workmen's Co-operative, at Maesteg, 105
Coal, Dear, A Consequence of, 118
Coal, Discovery of, in Denmark, 240
Coal Discovery of, in Georgia, 3
Coal, Discovery of, in Nelson, New Zealand, 370
Coal, Discovery of, in Penydarran, 401
Coal, Explorations for, in Brazil, 50
Coal Famine, A, at Melbourne, 270
Coal in France, 35, 72, 265, 341, 367
Coal on French Railways, Accumulation of, 444
Coal, German, Exports of, 158
Coal in Gippe' Land, Discoveries of, 104
Coal and Gold in New South Wales, 173
Coal in Greece, 267
Coal and Iron Company, Monkland, Directors Report of the, 191
Coal and Iron Company, The Bilsa, Advance of Wages by, 377
Coal and Iron Company, South Yorkshire, An Industrial, 237
Coal and Iron near Frome, Discovery of, 286
Coal and Iron Production of Derbyshire, 7
Coal and Iron, Tasmanian, 234
Coal in Manitoba, Discovery of, 389
Coal Mines Regulation Act in South Yorkshire, 255
Coal Mines, Wales, Number of Persons Employed in, 211
Coal Miners of Scotland, Conference of the, 116
Coal Mining, French, 462
Coal Mining in the North of France, Progress of, 288
Coal, More, Discovered in Somersetshire, 88, 124
Coal, New South Wales, for the Admiralty, 373
Coal in New South Wales, The Price of, 332
Coal in New Zealand, 67, 228, 240, 270, 303, 370
Coal at Pontypool, Price of, 183
Coal, Quantity Exported from France, 133
Coal, Quantity Exported from Vancouver's Island, 402
Coal, Quantity Imported into France, 158
Coal, Quantity Produced in Cumberland, Maryland, 133
Coal in Queensland, Another Discovery of, 133
Coal Question, Edinburgh Town Council on the, 105
Coal Question, The, in France, 219
Coal Question, The, and Herr Krupp, 50
Coal Question, A Welsh Opinion of the, 222
Coal, Recent Discoveries of, in Sweden, 240
Coal, Reduction in the Price of, in Derbyshire, 367
Coal, Reduction in the Price of, in Lanarkshire, 362
Coal, Reduction in the Price of, in West Yorkshire, 317
Coal Seams in the Isle of Wight, 174
Coal in South America, 7
Coal Supply for the French Railways, 412
Coal in Texas, Discovery of, 368
Coal Trade in Belgium, 158, 285, 325, 368, 423, 444
Coal Trade of the Forest of Dean, Depression in the, 269
Coal Trade, The, in Rhymney Valley, 443
Coal Trade in Scotland, Progress of the, 270, 288, 325
Coal Trade, The Somersetshire, 269
Coal Traffic, The London and South Yorkshire, 51, 118, 211, 270
Coal Traffic on Railways, South Wales, 269
Coal Traffic on the Taff Vale Railway, 124
Coal in the United States, Total Production of, 212
Coal, Welsh, Conveyed by the Great Western Railway, 211
Coalfields, Illinois, Capital Employed in the, 50
Coalfields, Sutherland, Striking Coal at the, 340
Coal-getting at Unstone, near Sheffield, 68
Coalowners and their Profits, 130
Coke, Large Shipments of, at Cardiff, 286
Coke, The Price of, at Sheffield, 462
Coliban and Geelong, Water Supply of, 86
Collieries and Iron Works in the Maesteg Valley, 186
Collieries, The Llanelly, Application for an Advance of Wages at, 341
Collieries, Risca, Additional Shaft to, 219
Collieries in South Yorkshire, More New, 270
Colliers, The Aberdare Valley, 462
Colliers, Steam, Profits of by the Philadelphia and Reading Railway Company, 118
Colliers, Strike of, in the Forest of Dean, 255
Colliers' Wages, Advance of, in Somersetshire, 88
Colliers' Wages, Sheffield, Advance of, 118
Colliery and Blast Furnace, A New, at Cudworth, near Barnsley, 288
Colliery Company, The Great Western, 124
Colliery on Fire near Ripley, 51, 68
Colliery, The Hendredenny, Progress of, 462
Colliery, Important New, in South Yorkshire, 381
Colliery, Inundation of, in Monmouthshire, 88
Colliery Managers' Certificates, Examinations for, in Scotland, 444
Colliery, A New, at Blackwood, 341
Colliery, The Risca Black Vein, 377, 443
Colliery Undertakings and Alterations, South Yorkshire, 7, 51, 211, 270, 367, 381
Colliery, Unstone Moulds, Sale of the, 7
Colorado River, The, 212
Columbia, British, Dimensions of, 352
Commerce of New York, 54
Companies, Limited Liability, New, in South Yorkshire, 255, 317, 367
Companies for the Manufacture of Peat Fuel in Dumfries, 349
Company, The Baltimore Bridge, 108
Company Formed in Montreal for Working Nova Scotian Coal, 286
Company for Lighting Railway Carriages, Formation of, 386
Company, A New Gas, for the Purchase of Mr. J. F. H. Parker's Patents, 326
Company, The Samana Bay, General Arrangements of, 367
Company, Scotch Ironmaking (late William Dixon's), Commencement of, 255
Company, Swedish Iron and Rolling Stock, Prospectus of, 287
Company, The Western of France Railway, Cost of Works for, 262
Conference between Mr. Brogden and his Colliers, 462
Congress at Leeds, Trades Union, 68
Constantinople and Marseilles, Acceleration of Mails between, 227
Constantinople Tramways, Progress of, 147, 239
Constantinople, The Water Supply of, 35
Contract, Engineering, for Tradeston Flour Mills, 211
Contract for the Toronto, Grey, and Bruce Railway, 86
Contracts for the Dundee Water Works, 16
Conversazione at the Institution of Civil Engineers, 368
Co-operative Undertaking at Sheffield, Another, 191
Copper, Discovery of, in Pennsylvania, 254
Copper in South Australia, Increased Production of, 370
Costa Rica, Progress in, 76
Costa Rica Railway, Progress of the, 69
Cotopaxi, Ascent of, by Dr. Reiss, 367
Cottages, Proposed Construction of, in Ogmore Valley, 255
Cowes, Steam Launch Building at, 15
Cowes, Steamship Building at, 15, 88
Crisis, Great, in the Cleveland Iron Trade, 367
Croton Water Works, New York, 6
Crystal Palace Company, New York, 303
Culm Valley Light Railway, 43
Cumberland (Maryland) Coal, Quantity Produced in, 133
Custom and Dock Dues at Bristol, 401
Cut Nail, Bolt, Nut, and Wire Trades, Middlesbrough, Progress of, 186
Cwmbwrla Colliery, near Swansea, Explosion of Fire-damp at, 286
Cyfarthfa Iron Works, Rumoured Change in the Proprietorship of, 286

Dahlgren Gun, The, and the United States, 35
Dalbeattie Granite Quarries, Transfer of the, 27
Danks's Furnace in Belgium, 86
Danks's Puddling Furnace, 62, 106, 117, 134, 190
Darien, American Survey of the Isthmus of, 69
Darien Ship Canal Question, The, 18, 59
Darlington Section of the North-Eastern Railway, Management of the, 288
Darwent, Mr., Death of, 6
Davis, Mr. H. W., Engineer to the Great Eastern Railway, Presentation to, 262
Dear Coal, A Consequence of, 118
Death of M. Le Bas, 50
Death of Mr. Darwent, 6
Death of Mr. F. H. Elliott, 62
Death of Mr. J. Poole, 15
Death of Major Strobel, 152
Decision of the Commission for the Neva Bridge Designs, 432
Defective Drainage at Tottenham, 459
Defence of Fort Jackson, New South Wales, Guns for the, 228
Delaware Bay and River, Proposed Improvement of the, 434
Deloraine and Mersey Railway, Application for Loan by the, 191
Denmark, Discovery of Coal in, 240
Depression in Trade at Cardiff, 269
Deputies and Underviewers, Meeting of, at Sheffield, 87
Derbyshire, Miners' Agitation in, 27, 51, 68
Derbyshire, Reduction in the Price of Coal in, 367
Devon and Somerset Railway, Projected Opening of the, 360
Devonport Dockyard, Admiralty Order at, 43
Devonshire, Discovery of Iron in, 152, 222
Discovery of Coal in Penydarran, 401
Dispute at J. Brown and Company's Works, Sheffield, 68, 118
Dispute, A Tramway, 341
Dividend of C. Cammell and Company, Sheffield, 7
Dividend of the Châtillon and Commentry Forges Company, 462
Dividend of the Mokta-el-Hadid Magnetic Iron Minerals Company, 288
Dividend of the Rio de Janeiro Gas Company, 288
Dividends of Local Companies, Sheffield, 87
Dividends of Lydney Iron and Steel Companies, 255
Dividends of South Yorkshire Undertakings, 118
Dixon's, William, Scotch Ironmaking Business, Converted into a Company, 255
Dock and Customs Dues at the Port of Bristol, 401
Dock, Graving, for the Tees, 262
Dock, New, Berwick-on-Tweed, Contracts for, 51
Dock, New Graving, on the River Tyne, 262
Dock, The Skoberoes, Progress of, 105
Dock Works, The Burntisland, 51
Docks, The Avonmouth, Progress of, 255, 300, 360
Docks, The Bristol Channel, Progress of, 68, 88, 240
Docks, Bristol, The Revenue of, 68
Docks, The Bute, Goods Imported into, 105, 186
Docks, Cardiff, and the Steam-Coal Shippers, 360
Docks Committee, Bristol, Election of Chairman for the, 43
Docks, Gloucester, Tenders for the, 240
Docks at Milford Haven, Mr. E. J. Reed on their Advantages, 319
Docks, Pembroke, Arrival of Armour Plates at, 443
Docks, Point St. Charles, Progress of, 255
Docks, Proposed New, in the Tees, 7, 124
Docks, The Santos, Extension of Time for the Completion of, 328
Docks, Sharpness, Progress of, 319
Docks, Southampton, Deepening of the, 135
Dockyard, Devonport, Admiralty Order at, 43

Dodsworth and Silkstone Coal and Iron Company, The, 310
Doncaster Water Works Scheme, 68
Doty Lamp, The, and the Greenock Chamber of Commerce, 51
Dowlais Works and the London and North-Western Railway, 443
Drainage, Main, Ravensthorpe, 411
Drainage Works in Holland, 362
Dredge Fleet, Launch of a, 194
Dredging the Mississippi, 461
Dredging Operations at Port Adelaide, 326
Dredging the Patapsco River, 358
Dundee Harbour Works, Progress of, 174, 246, 362
Dundee, New Cattle Market for, 16
Dundee, The Tay Bridge Tunnel Works, Progress of, 219
Dundee Tramways and Mr. Page's Patent, 51
Dundee Water Works, Contracts for the, 16, 51
Dunedin and Port Chalmers Railway, Progress of the, 35, 115, 212
Duplex System of Telegraphy, Success of, at Sheffield, 270
Dutch Steam Navigation, 50, 423
Dynamite, Experiments with, on the Halifax and Ovenden Railway, 126
Dynamite, Experiments with, in Scotland, 105

East Gloucestershire Railway, Opening of the, 68
Ebbw Vale Steel, Coal, and Iron Company and the Factory Act, 377
Ebbw Vale Steel, Coal, and Iron Company, Call on Shares, 253
Ebbw Vale Steel, Coal, and Iron Company, Work Recommenced by, 235
Ebbw Vale Steel, Coal, and Iron Company, Change in the Management of, 341
Economy of Fuel, 283
Economy, Indian Railway, 461
Edinburgh and Leith Engineers' Society, 86, 157, 275, 409
Edinburgh Town Council on the Coal Question, 105
Edinburgh, Widening of the North Bridge, 86
Education, Technical, in Scotland, 191
Egypt, Public Works in, 240
Elliott, Mr. F. H., Death of, 62
Ellis's Wood-Cutting Machine, Inspection of, 150
Elsecar and Hoyland Collieries, Operations at, 51
Emigrant Ship built on the Tees, Trial Trip of, 450
Enamelling Paint, Griffith's, 454
Engineering, Cleveland, 7, 51, 86, 124, 130, 158, 186, 268, 310, 341, 400, 423, 459
Engineering College, Japanese, Appointment to the, 270
Engineering Extensions at Kilmarnock, 174
Engineering, Mechanical, in Cornell University, 70
Engineering Operations in South Yorkshire, 462
Engineering in Otago, New Zealand, 67
Engineering Trades, Glasgow, 67
Engineering Trades, Sheffield, Agitation for Increase of Wages, 381
Engineering Works in South Yorkshire, 27, 191, 219, 227, 255, 310, 367, 381, 399, 423
Engineers of the North and their Wages, 265
Engineers and Shipbuilders in Scotland, The Institution of, 67, 288
Engineers' Society, The Civil and Mechanical, 27, 401, 434
English Coal in France, Increase of, 461
Enterprise, Canadian, 192, 267
Enterprise, Railway, 423
Enterprise, Telegraphic, 43
Erie Canal, Proposed Enlargement of the, 10, 111
Erie Railway, Rolling Stock, 287
Erratum, 267
Examinations for Colliery Managers' Certificates in Scotland, 444
Exeter and Bristol Railway Company and the Gauge Question, 152
Exhibition of 1873, The London International, 26, 183, 196, 215, 287
Exhibition, The Vienna, 240, 463
Exhibition, The Vienna, and New Zealand, 240
Experiments with Dynamite on the Halifax and Ovenden Railway, 126
Experiments with Dynamite in Scotland, 105
Explosion, Boiler, at South Stockton, 315
Explosion of Firedamp at Cwmbwrla Colliery, near Swansea, 288
Export of Petroleum from Philadelphia, 80, 360
Export of Rails from Belgium, 287
Exports of Belgian Coal, 158
Exports of Belgian Iron, 6
Extension Railways in Northern Canada, 270
Extensions and Transfers in South Yorkshire, 443

Factory Act, The, and the Ebbw Vale Steel, Coal, and Iron Company, 377
Fairbank's Manufactory, Vermont, Extent of, 389
Fairfield Association, Glasgow, Meeting of the, 219
Fan, New Ventilating Guibal, at Manver's Main Colliery, Wath, 27
Fast Steam Launches, Construction of, by J. Thorneycroft, 315
Ferryboat for the Great Western of Canada, 341
Festival, Annual, of Glasgow Corporation Gas Employés, 137
File Grinders, Strike of, at Sheffield, 317, 341
Finished Iron Trade, The Glasgow, 191, 255, 270, 288
Fire at a Colliery near Ripley, 51, 63
Fire Engine, Steam, amongst the Mills, 18
Fire Engine, Steam, Proposed Purchase of a, for Greenock, 270
Fires, American, Money Lost by, 133
Flooding of Garforth Collieries, near Leeds, 105
Flooding of the Manor Colliery, Sheffield, 27, 69, 105
Flour Mills, Tradeston, Engineering Contract for, 211
Foremen Engineers and Draughtsmen, London Association of, 9, 26, 84, 92, 164, 326, 412
Forest of Dean, Labour in the, 35, 88, 124, 151, 255, 269, 288, 377, 401, 443
Forgery of Jackson, Gill, and Company's Shares, 7
Fortifications, German, 438
Fortifying Rome, Plans for, 212
Fortunate Railway, A, 135
Fox, Head, and Co.'s Co-operative Works, 400
France, Coal in, 35, 79, 135, 219, 265, 341, 367
France, Coal Mining in the North of, 288
France, Exports of Coal from, 139
France, Public Works in, 116
France, Quantity of Coal Imported into, 265
France, Quantity of Iron Minerals Imported into, 367
France, Quantity of Rails Exported from, 86
France, Total Production of Pig Iron in, 228
Fraserburgh, Proposed Breakwater at, 16
French and Belgian Mechanical Industry, 240
French Canal, A New, 50
French Coal Imports, Total Quantity of, 158
French Coal Mining, 462
French Forge Masters, Return by, of the Quantity of Rails used in France, 173
French Iron Trade, The, 7, 67, 118, 183, 173, 212, 288, 378
French "Local Railways," 7
French Metallurgical Industry, 228
French Navy, The, 419
French Railways and their Coal Supply, 412, 444
French Railway Working Charges, 341
French Steam Shipping Company, Receipts of the, 412
French Steel Making, 449
French Transatlantic Steam Navigation Company, 133, 412
Fuel Economiser and Smoke Preventer, A New, 51
Fuel, Economy of, 283
Fuel in Georgia, U.S., Scarcity of, 158
Fuel, Peat, Companies for the Manufacture of, in Dumfries, 340
Furnace, A New Blast, at Blaenavon, 401
Furnaces, New Blast, in the North of England, 27

Galashiel's Water Supply, 135
Garforth Collieries, near Leeds, Flooding of, 105
Gas at Adelaide, Tenders for, 228
Gas, Advance in the Price of, in Scotland, 423
Gas at Barnsley, Increased Price of, 174
Gas Coal, Victorian, Specimens of, 412
Gas Company, The New, 84
Gas Company, A New, for the Purchase of Mr. J. F. H. Parker's Patents, 326
Gas Company, The Rio de Janeiro, Dividend of the, 288
Gas Company, The Wellington, New Zealand, Dividend of the, 310
Gas Lighting in New South Wales, 135
Gas Managers' Association, The North British, Inaugural Address of the, 421
Gas Managers' Association, West of Scotland, Meeting of, 212
Gas in New York, Annual Consumption of, 412
Gas in Paris, Profits Realised by, 288
Gas at Wheaunton, Price of, 152
Gas Works Extension at Selkirk, 423
Gas Works, Greenock, Progress of the, 270
Gas Works, New, at Newmilns, Ayrshire, 135
Gatling Gun, Proposed Use of the, in America, 270
Gauge, An African Steam, 35
Gauge, Change of, on the Intercolonial Railway, 288
Gauge Changing on the Great Western of Canada Railway, 368
Gauge Question, The, in Chili, 50
Gauge Question, The, in the West of England, 152
Geelong Water Works, Failure of, 212
General McClellan, Resignation of, 423
Georgia, Discovery of Coal in, 3
Georgia, U.S., Scarcity of Fuel in, 158
German Coal, Exports of, 158
German Coal in Paris, 228
German Collieries, Sale of, 212
German Fortifications, 438
German Ironmasters in Sweden, 67
German State Railways, Estimated Outlay for, 50
Germany and the Iron Trade, 118
Gippa's Land, Discoveries of Coal in, 104
Girard Avenue Bridge, Completion of the, 328
Glamorgan Canal, Proposed Introduction of Steam Power on the, 255
Glamorganshire and Monmouthshire Ironworkers, Meeting of, 269
Glasgow Association of Engineers, 51, 191
Glasgow Corporation Gas Employés, Annual Festival of, 137
Glasgow Engineering Trades, The, 67, 461
Glasgow Finished Iron Trade, The, 191, 255, 270, 288
Glasgow Harbour, Proposed Purchase of, by Greenock Harbour Trustees, 116
Glasgow Harbour Works, 341
Glasgow to Kilmarnock, The New Line of Railway from, 461
Glasgow Malleable Iron Trade, The, 105, 248, 409, 423
Glasgow, Meeting of Philosophical Society at, 86
Glasgow Pig-Iron Market, The, 16, 35, 51, 67, 86, 103, 116, 135, 157, 174, 191, 211, 219, 240, 255, 270, 288, 303, 324, 340, 360, 367, 380, 400, 423, 441, 461
Glasgow, State of the Pipe-Founding Trade at, 103
Glasgow Tramways, 35
Glasgow Water Works, Mr. Gale's Quarterly Report on the, 68
Glenelg, Adelaide, and Suburban Railways, Meeting of Shareholders, 93
Gloucester and Berkeley Canal, Progress of, 319
Gloucester Docks, Tenders for the, 240
Gold and Coal in New South Wales, 173
Gold Mining, Victorian, Number of Persons Engaged in, 287
Gold in New South Wales, Increased Production of, 332
Gold in New Zealand, Total Yield of, in 1872, 361
Govan Graving Dock, Tidal Damage to, 35
Government Inspection of Mines, Appointment of a Sub-Inspector, 341
Grand Trunk Railway of Canada, Appointment of Mr. J. Melville, 86
Grand Trunk Railway, Improvements on the, 444
Grand Trunk Railway, Rolling Stock for the, 7, 444
Grand Trunk Railway, Steel Rails for the, 341
Granite Quarries, Transfer of the Dalbeattie, 27
Granton Harbour, Proposed Extension of, 174
Graving Dock, The Albert, Victoria, Progress of, 368
Graving Dock, New, on the River Tyne, 262
Graving Dock, Swansea, 211
Graving Dock, A, for the Tees, 262
Great Asian Railway, The Proposed, 444
Great Canadian Bridge, Completion of a, 444
Great Indian Peninsula Railway, Locomotives on the, 444, 462
Great Northern Railway Coal Traffic from South Yorkshire, Decrease of, 211
Great Southern of India Railway, Progress of, 389, 412
Great Western of Canada, Ferry Boat for the, 341
Great Western of Canada Railway, Gauge Changing on the, 368
Great Western Colliery Company, 134
Great Western Railway Company in Wales, 152
Great Western Railway, Half-Yearly Cost of Coal and Coke on the, 255
Great Western Railway, Interlocking on the, 300
Great Western Railway, Labour on the, 462
Great Western Railway, Proposed Arrangement by the, 15
Great Western Railway, Signalling on the, 152
Great Western Railway Station Accommodation, 174
Great Western Railway, Strike on the, 434
Great Western Railway, Train Mileage on the, 186
Great Western Railway, Wages on the, 186, 255
Great Western Steamboats, Extension of, 186
Greece, Coal in, 267
Greece, Progress of Mining in, 262
Greeley, The late Horace, Proposed Monument to, 35
Greenock Chamber of Commerce and the Doty Lamp, 51
Greenock Gas Works, Progress of the, 270
Greenock Harbour Trust, Engineers' Salaries, 35
Greenock, New Shipbuilding Yard at, 462
Greenock, Progress of the Sugar Trade in, 105, 157
Greenock, Proposed New Railway Station at, 219
Grenville Canal, Progress of the, 7
Griffith's Enamelling Paint, 454
Gun, The Dahlgren, and the United States, 35
Gun, The Gatling, Proposed Use of, in America, 270
Gunnery, Philosophical, 199
Gunpowder Company, The Schultz, in England, Application to Canadian Parliament, 228
Guns for the Defence of Port Jackson, New South Wales, 228
Gusenada Railway, Buenos Ayres, Inauguration of, 163

Half-Yearly Report on the Tay Bridge Works, 219
Half-Yearly Return of the Rolling Stock on the Great Western Railway, 300
Halifax and Ovenden Railway, Experiments with Dynamite on the, 126
Harbour, Boulogne, 203
Harbour, Dundee, Proposed Extension of, 174, 246, 362
Harbour Engineer, Aberdeen, Salary of, 51
Harbour, Granton, Proposed Extension of, 174
Harbour Improvements, Arbroath, 105
Harbour Improvements Bill, Neath, 88
Harbour Improvements, Monte Video, 341
Harbour, Pier and Jetty, Opening of, at Ilfracombe, 401
Harbour Trust, Greenock; Engineers' Salaries, 35
Harbour Works, Aberdeen, Progress of, 400
Harbour Works, Anstruther, Progress of, 362
Harbour Works, Glasgow, Progress of, 341
Harbour Works, Montreal, Progress of, 134
Harbour Works, Wick, Special Committee, 67
Harbours, Glasgow, Proposed Purchase of, by Greenock Harbour Trustees, 116
Head, Fox, and Co.'s Co-operative Works, 400
Hendredenny Colliery, Progress of the, 462
H.M.S. Ocmules, Return of, 43
Herr Krupp and the Coal Question, 50
Hibernia and Shamrock Collieries, Westphalia, 212
High Level Railway, Proposed, Round Dundee, 16
High Tide and Damage to Govan Graving Dock, 35
Hobson's Bay and Melbourne Railway, 158
Holland, Drainage Works in, 362
Honour to a Clyde Shipbuilder, 340
Hoosac Tunnel, Progress of the, 173
Hopkins, Gilkes, and Co.'s Works, Middlesbrough, Strike at, 174, 186, 203, 227, 310, 341, 367
Horace Greeley, The Late, Proposed Monument to, 35
House Coal Colliers, Monmouthshire, Meeting of, 227
House Coal Colliers, South Wales, Threatened Strike of, 240
House Rents Round Sheffield, Great Advance in, 67
Houses in Philadelphia, Increase of, 35
Hoyland and Elsecar Collieries, Operations at, 51
Hudson River and New York Central Railroad, 270
Hudson, The River, Proposed Improvement of, 158
Hydershad, Narrow Gauge Railways for, 67
Hydraulic Works Company, The Lachine, 95

Illinois Central Railway, Extent and Expenses of the, 287
Illinois Coal Fields, Capital Employed in, 50
Important New Colliery in South Yorkshire, 381
Imports, American Rail, 35
Imports of Coal into France, 265
Improvements on the Grand Trunk Railway, 444
Improvements in Ordnance, American, 462
Increase of English Coal in France, 461
Increase in the Revenue of the Suez Canal, 240
India, Locomotives in, 412
Indian Railway Economy, 461
Indian Railways, Cheap, 412
Indian Railways, Sir Charles Trevelyan's Opposition to the Narrow Gauge, 328
Indian Salt, 444
Industries, New Zealand, 67, 105
Inspection of Boilers in the United States, 412
Institute of Mining Engineers, Midland, Meeting of, 255, 381
Institution of Civil Engineers, The, 86, 89, 106, 168, 236, 262, 317, 353, 368
Institution of Engineers, Glasgow, Meeting of, 212
Institution of Engineers and Shipbuilders in Scotland, The, 67, 288
Institution of Naval Architects, 147
Institution, The Royal United Service, 36
Intercepting Sewer, The Avon, 443
Intercolonial Railway, Change of Gauge on the, 288
Intercolonial Railway, Extra Claims by Contractors for the, 194
Intercolonial Railway, Snow Drifts on the, 203
Interlocking on the Great Western Railway, 300
Iron, Belgian, Official Return of the Quantity Exported, 104
Iron and Coal Company, Monkland, Directors' Report of, 191
Iron and Coal Company, South Yorkshire, An Industrial, 237
Iron and Coal near Frome, Discovery of, 236
Iron and Coal Production of Derbyshire, 7
Iron Company, The Parkgate, Meeting of the, 309
Iron in Devonshire, Discovery of, 152
Iron Exports to New York, 105
Iron Industry in Russia, 426
Iron, Manufactured, in Maryland, 190
Iron Market, The Cleveland, 7, 400, 423, 450
Iron Minerals, Luxembourg, 399
Iron Minerals, Quantity Imported into France, 367
Iron Ore, Canadian, Exhibition of Specimens, 158, 174
Iron Ore Company, The Wigpool, 83
Iron Ore, Extensive Discoveries of, in Tasmania, 67, 158, 184, 219, 443
Iron Sleepers on Belgian Railways, Result of Trials, 399
Iron in the State of Maryland, 174
Iron and Steel Company, The Ebbw Vale, Change in the Management of, 341
Iron and Steel Institute, Meeting of, at Middlesbrough, 459
Iron and Steel Works, New, at Sheffield, 219
Iron, Tasmanian, 184, 219
Iron and Titanic Steel Company, New Zealand, 86
Iron Trade, The Belgian, 67, 118, 183
Iron Trade, The Cleveland, 27, 51, 62, 86, 106, 124, 130, 158, 174, 186, 203, 227, 247, 262, 268, 288, 310, 315, 341, 367, 400
Iron Trade, The French, 7, 67, 118, 183, 173, 212, 288, 378
Iron Trade, The, and Germany, 118
Iron in the United States, 67
Iron Work Masters in Sheffield, 443
Iron Works, Blochairn, Scotland, Disposal of, 340
Iron Works, The Briton Ferry, Progress of, 84
Iron Works and Collieries in the Maesteg Valley, 186
Iron Works, The Cyfarthfa, Rumoured Change in the Proprietorship of, 288
Iron Works, Llynvi, Progress of, 232
Iron Works and Mining Developments in Derbyshire, 153
Iron Works, New, in South Wales, 153
Iron Works, North British, Coatbridge, Scotland, Extension of, 35
Iron Works, Working Men's Co-operative, Sheffield, Commencement of, 105
Ironfounding, Cleveland, 130
Ironmasters' Association, Cleveland, Returns of the, 27, 315, 423
Ironsand, New Zealand, Successful Experiments in Smelting the, 270
Ironstone, Canadian, 7
Ironstone, Cleveland, Advance in the Price of, 86
Ironstone Miners, The Cleveland, 7, 27, 86, 186, 203, 227, 245, 288, 310, 315, 341, 400, 423, 450
Ironstone Miners, Cleveland, and the Proposed Board of Arbitration, 268
Ironworkers, Meeting of, at Swinton, 87
Ironworkers of the North of England and their Wages, 227, 245
Island, Prince Edward's, 10
Isle of Wight, Coal Seams in the, 174

Ismidt and Bagdad Railway, 118
Ismidt and Scutari Railway, Inspection of the, 368

Isthmus of Darien, American Survey of, 69
Italian Telegraphy, Progress of, 236
Inundation of a Colliery in Monmouthshire, 88

Jackson, Gill, and Company's Shares, Forgery of, 7
James River Canal, Plan for the Completion of, 15
Japanese Engineering College, Appointment to the, 270
Japanese Government, Construction of a Steamer for the, in America, 262
Japanese Progress, 181
Judgment in the House of Lords for the Taff Vale Railway, 341

Kelham Forge and Rolling Mills, Sheffield, Sale of the, 288
Kilmarnock, Engineering Extensions at, 174
Kirkstall Forge, A Large Casting at, 462
Krupp, of Essen, in Spain, 86

Labour in the Forest of Dean, 35, 88, 124, 152, 255, 268, 286, 377, 401, 443
Labour on the Great Western Railway, 462
Labour in South Wales, 18, 42, 153, 156, 211, 340, 377, 819, 377
Lachine Hydraulic Works Company, 95
Lanarkshire, Reduction of the Price of Coal in, 362
Lang, Mr. W. C., Presentation to, at Liverpool, 262
Large Casting by the Abercorn Foundry Company, Paisley, 461
Lath-Casting Machine, Ellis's, 150
Launceston, Tasmania, Arrival of Navvies for the Main Line Railway, 268
Launch of a Dredge Fleet, 194
Launch of Iron Screw Steamer at Stockton, 68
Launch of Large Steamer on the Clyde, 239
Launch at Pembroke Dockyard, 152, 240
Launch for the South Wales Atlantic Steamship Company, 186
Launches, Fast Steam, Construction of, by J. Thorneycroft, 315
Launches, Steam, for the Royal Mail Steam Packet Company, 124
Law Reform, Patent, 165
Laws, Our Patent, 215
Lay Sermons, 211
Le Bas, Death of M., 50
Lecture at the Philosophical Society of Greenock, 191
Lectureship on Applied Mechanics, Anderson's University, Glasgow, 16
Lee, Reaney and Company, Eldon Works, Sheffield, Meeting of Creditors, 317
Leeds, Election of Surveyor and Engineer for, 68
Leeds, New Bridge over the River Aire, Progress of, 310
Leeds, Trades Union Congress at, 51, 68
Leith and Edinburgh Engineers' Society, 86, 157, 225, 409
Lemon, Mr. J., Number of Votes for the Office of Engineer at Leeds, 68
Light Draught Steamers in Pennsylvania, 212
Light Railway, Culm Valley, 43
Light, The Silber, 217
Light, The Westminster Signal, 460
Lighthouse, Erection of, in Costa Rica, 76
Lighthouse, Proposed New Australian, 118
Lighthouses, Canadian, 462
Lighthouses, Contract for Oil, 147
Lighthouses, Queensland, Tenders accepted for the, 288
Lighting Railway Carriages, Company formed for, 346
Lime Kilns, Strike at the, 215, 341
Limited Liability Companies, New, in South Yorkshire, 265, 317, 367
Llanelly Collieries, Application for an Advance of Wages at, 341
Llanelly Railway, and the Great Western, 35
Llynvi Iron Works, Progress of, 222
Local Companies, Sheffield, Dividends of, 87
"Local Railways," French, 7
Locomotion in the Argentine Republic, 400
Locomotive Expenses on the Great Indian Peninsula Railway, 462
Locomotive Wages on the Great Indian Peninsula Railway, 462
Locomotive Works, The Baldwin, Philadelphia, 314, 367, 390
Locomotive Works, The Brooks, New York, 270
Locomotives on the Great Indian Peninsula Railway, 444
Locomotives in India, 412
Locomotives for the Rhymney Railway, 124
Locomotives, Victorian, Manufacture of, at Ballarat, 303, 359, 444
London Association of Foremen Engineers and Draughtsmen, 9, 36, 84, 92, 164, 326, 412
London and County Bank, Annual Meeting of, 126
London International Exhibition of 1873, 26, 133, 198, 215, 237
London and North-Western Railway and the Bowlain Works, 445
London and North-Western Railway, Extension of, 18, 401
London and South-Western Railway, Traffic Receipts, 155
Luxembourg Iron Minerals, 360
Lydney and Wigpool Iron Ore Company, Dividend of the, 255
Lyons, Paris, and Mediterranean Railway, Rolling Stock on the, 367

Machine for Wood-Cutting, Ellis's, Inspection of, 180
Machinery at Wilson and Cammell's New Works, Dronfield, 191
Madeira and Mamord Railway, 105, 173
Madrid, Saragossa, and Alicante Railway, Progress of the, 462
Maesteg Valley, Great Activity in, 186
Mails, New Zealand, Time occupied in the Transit of, 27
Main Drainage, Oxford, 174, 326
Main Drainage, Ravensthorpe, 411
Malleable Iron Trade, The Glasgow, 105, 246, 400, 423
Mamoré and Madeira Railway, 105, 173
Management of the Darlington Section of the North-Eastern Railway, 288
Manchester, Meeting of the Mechanical and Scientific Society, 52
Manchester Steam Users' Association, Meeting of, 211
Manitoba, Discovery of Coal in, 389
Manor Colliery, Sheffield, Flooding of the, 27, 68, 105
Manufacture of Peat Fuel in Dumfries, 400
Manufactured Iron in Maryland, 190
Marine Department of the Board of Trade, Appointment of the Hon. Digby Murray, 104
Marsden's Steam Road Metal Crusher at Ayrshire Agricultural Show, 325
Marvellous Victoria, 212
Maryland, Iron in the State of, 174, 190
Mechanical Engineering in Cornell University, 70
Mechanical Industry, Canadian, 462
Mechanical and Scientific Society, Manchester, Meeting of, 52, 75, 165
Mediterranean, Steam Navigation in the, 133
Meeting, Annual, of the Canadian Inland Navigation Company, 158
Meeting, Annual, of the London and County Bank, 106
Meeting, Annual, of the Sheffield Water Works Company, 288
Meeting, Annual, of the Suez Canal Company, 456
Meeting of the Bristol United Gas Light Company, 211
Meeting of the Clyde Trust, 400
Meeting of the Fairfield Association at Glasgow, 219
Meeting, Half-Yearly, of the Bristol and North Somerset Railway, 35
Meeting of the Institution of Engineers, Glasgow, 212
Meeting of the Midland Institute of Mining Engineers, 255
Meeting of the Monmouthshire Railway and Canal Company 229
Meeting of the Philosophical Society of Glasgow, 86, 191, 270
Meeting of the Proprietors of the Toronto, Grey, and Bruce Railway, 86
Meeting, Quarterly, of the Cleveland Iron Trade, 27
Meeting of the Royal Scottish Society of Arts, 51, 135, 191, 219, 303
Meeting of the Severn Commissioners, 88
Meeting of the Sheffield United Gaslight Company, 288
Meeting of the Society of Arts, 174
Meeting, Special, of the Rhymney Railway Company, 443
Meeting of Steam Coalowners in South Wales, 68
Meeting of Steam-Coal Colliers at Abercarne, 341
Meeting of Underviewers in South Yorkshire and Derbyshire, 158
Meetings of Shareholders in Sheffield, 399
Melbourne, A Coal Famine at, 270
Melbourne and Hobson's Bay Railway, 158
Melbourne (Victoria) Mint, Amount of Gold Issued from, 262
Mersey and Delorsine Railway, Application for Loan by the, 191
Merthyr and Brecon Railway, The, 68, 124, 423
Merthyr Dare Company, Commencement of a New Colliery at Aberdare, 105
Merthyr Tydvil, Trade at, 269, 377, 401
Messageries Maritimes, The, 227, 412
Metal Brokers, Northern, Visit of, to Bristol, 240
Metallurgy, Belgian, 86, 212
Metallurgical Industry, French, 228
Michigan Central Railway, Steel Rails on the, 50
Middlesbrough, Advance of Blast Furnace Men's Wages at, 262, 268
Middlesbrough Ironstone Miners, Strike of, 7, 27
Middlesbrough, New Railway Station at, 186
Middlesbrough, New Works at, 7
Middlesbrough, Tramways at, 27
Middlesbrough, Strike at Hopkins, Gilkes, and Co.'s Works, 174, 186, 203, 227, 310, 341, 367
Middlesbrough Warrant Stores, 62
Midland Institute of Mining Engineers, Meeting of, 255, 381
Midland Railway, The, and Mr. Adams, 452
Milford Haven, Inspection of, by Mr. E. J. Reed, 105
Milford Haven, Mr. E. J. Reed, on the Advantages of Docks for, 319
Milford Haven and the Pacific Steam Navigation Company, 135
Military Utility of Railways, 173
Mill, A New American Rolling, 423
Mine, Sulphur, Discovery of, in Bosnia, 368
Mineral Property in the West of England, 300
Mineral Railways, South Wales, 286
Mineral Wealth of Pennsylvania, 341
Minerals, Algerian, 444
Minerals, Canadian, 212
Minerals, Discovery of, in Devonshire, 222
Miners' Agitation in Derbyshire, 27, 51, 68
Miners' Association, North Wales, Resolution Passed by the, 319
Miners' Strike in Ayrshire, Termination of, 86
Miners' Wages, The Question of, in South Yorkshire, 158
Miners' Wages and the Price of Coal at Sheffield, 174
Mines, Government Inspection of; Appointment of a Sub-inspector, 341
Mines Regulation Act and Underviewers, Sheffield, 219
Mining in Greece, Progress of, 262
Mining Institute and Schools, Proposed, in South Yorkshire, 105
Mining and Iron Works Developments in Derbyshire, 158
Mining, South American, 104
Mining in Western Australia, 462
Mint, The Melbourne (Victoria), Amount of Gold Issued from, 262
Miscellaneous Undertakings and Projects at Sheffield, 174
Mississippi, The River, Cost of a Ship Canal from, 86
Mississippi, River, Navigation of the, 412
Missouri River, Proposed Tunnelling of the, 2
Model, A Wonderful, 378
Mokta-el-Hadid Magnetic Iron Minerals Company, Profits of the, 288
Mole, Proposed, for Buenos Ayres, 341
Monkland, Iron and Coal Company, Directors, Report of, 191
Monmouth and Ross Railway, Trial Trip on the 341
Monmouthshire and Glamorganshire Ironworkers, Meeting of, 269
Monmouthshire, House-Coal Colliers, Meeting of, 227
Monmouthshire Railway and Coal Company, Meeting of, 229
Monte Video Harbour Improvements, 341
Montreal Harbour Works, Progress of, 124
Montreal, Increase of Buildings in, 86
Montreal Ocean Steam Trade, Increase of, 212
Montreal and Ottawa Junction Railway, 456
Montreal, Shipping Accommodation at, 444
Montreal, The Trade of, 341
Montreal, Water Supply of, 133, 174, 398
Moudania and Brousa Railway, Inauguration of the, 368
Mount Bischoff, Tasmania, Discovery of Tin on, 444
Mountain Ash Steam-Coal Colliers, Meeting of, 401
Murray v. Clayton, Confirmation of Judgment, 183

Nail Works, Wrought, at Middlesbrough, Progress of the, 400
Nairn's Patent Traction Engine, 35
Nantymoel, Ogmore Valley, Prosperous Condition of, 255
Narrow Gauge Railways for Hyderabad, 67
Naval Architects, Institution of, 147
Navigation, Cardiff, Steam Coal at, 186
Navigation, Dutch Steam, 50
Navigation of the River Mississippi, 412
Navy, Brazilian, Expenses of the, 50
Navy, The French, 419
Navy, United States, Addition to the, 35, 158, 326
Neath Harbour Improvement Bill, 88
Neath Harbour, Proposed Enlargement of, 152
Neath Tramways, Application to Parliament, 211
Nelson, New Zealand, Discovery of Coal in, 370
Neva Bridge Designs, Decision of the Commission, 432
New Colliery, Rhodes and Son's, Dronfield, Progress of, 341
New Essen Minerals Company, Dividend of, 461
New Gas Company, 84
New Iron Works, 152
New Jersey, Central Railroad, Number of Locomotives on the, 341
New Smoke Preventer and Fuel Economiser, 51
New South Wales, Coals for the Admiralty, 373
New South Wales, Great Quantity of Tin in, 174
New South Wales, Increased Production of Gold in, 352
New South Wales, The Price of Coal in, 352
New South Wales, Queensland and Victoria Railways, Cost of the, 288
New South Wales Railways, Progress of, 67, 341
New South Wales, Reduction in the Price of Telegrams in, 315
New Steel and Iron Works at Sheffield, 219
New Works at Middlesbrough, 7
New Works, Wilson and Cammell's, Dronfield, Machinery at, 191
New York and Bristol Steamers, Contract for, 105
New York Broadway, Proposed Widening of, 268
New York Canals, Statistical Return of the, 190
New York Central and Hudson River Railroad, 270
New York, Commerce of, 34
New York Crystal Palace Company, 302
New York, Iron Exports to, 105
New York, Sewage in, 190
New York, Street Cleansing at, 6
New York, Street Locomotion in, 444
New York, Water Supply, Increase of, 7
New Zealand, Coal in, 67, 228, 240, 270, 303, 370
New Zealand Industries, 67, 105
New Zealand Mails, Time Occupied in the Transit of, 27
New Zealand, Progress in, 7, 253, 333
New Zealand, Public Works in, 333
New Zealand Railways, Tenders for, 384
New Zealand Steamers, Official Return of, 412
New Zealand, Surveys of, 341
New Zealand Telegraphy, Progress of, 367, 472
New Zealand, Total Yield of Gold in 1872, 361
New Zealand, Town Improvements in, 444
New Zealand and the Vienna Exhibition, 240
Newmilns, Ayrshire, New Gas Works at, 135
Newport, Abercarne Black Vein Steam Coal Company, 222, 377, 401
Newport Joint Railway Station, 222
Newport, Pontypool, and Caerleon Railway, Progress of the, 443
Newport, Quantity of Coal Exported from, 255
Newport, Trade at, 38, 43, 168, 255, 443
Newton, Mr. J., Retirement of, from the Mint, 163
Nicaragua Ship Canal, Explorations for the, 220
North Bridge, Edinburgh, Widening of the, 86, 255
North British Association of Gas Managers, Inaugural Address of the, 421
North British Iron Works, Coatbridge, Scotland, Extension of, 35
North-Eastern Railway, Management of the Darlington Section of the, 288
North-Eastern Railway of Victoria, The, 67, 190
North of England Blast Furnace Men and their Wages, 203, 227, 245
North of England Board of Arbitration, Meeting of, 51, 86
North of England Ironworkers and their Wages, 227, 245
North Pacific Telegraphy, 7
North Wales Miners' Association, Resolution Passed by the, 319
North-Western and London Railway, Extension of, 15
Northern Colonisation Railway, Canada, Explorations for the, 288
Northern of France Railway, Yearly Profits of, 317
Northern Metal Brokers, Visit of, to Bristol, 240
Northern Pacific Railroad, The, 7, 111, 118, 133, 270, 370, 423, 462
Northern Railway of Queensland, Progress of the, 190, 259
Nova Scotia, Erection of Lighthouse on Sable Island, 309
Nova Scotia Steamship Company, 190
Nova Scotia, Winter in, 86
Nova Scotian Coal, Company formed in Montreal for Working, 286
Nova Scotian Telegraphy, 7

Ocean Steam Trade of Montreal, Increase of, 212
Ocean Telegraphy, Brazilian, 95
Odessa, Water Supply of, 35
Offices of the Ebbw Vale Steel, Coal, and Iron Company, Removal of the, 462
Official Report on Belgian State Railways, 389
Ohio and Baltimore Railroad, Iron and Steel used in Repairing the, 103
Ohio and Chesapeake Railroad, Progress of the, 105, 174
Ohio, Extension of Railroads in, 86
Ohio, Improvement of the River, 20
Oil Axle Box, Beuther's, Company formed for the Purchase of, 326
Oil for Lighthouses, Contract for, 147
Omnibus Company in Scutari, 368
Omnibuses in Paris, Revenue of, 88
Ontario, Canada, The Petroleum Trade in, 55
Ontario Railways, Progress of, 240
Ordnance, Improvements in American, 462
Ore Mines, Spanish, Progress of, 255
Ore, Searching for, on Maundown, 377
Orel, A Russian Military Depôt, 368
Orleans Railway Company, Length of Concession to the, 367
Orontes, H.M.S., Return of, 43
Otago, New Zealand, Engineering in, 67
Ottawa and Montreal Junction Railway, 456
Our Patent Laws, 215
Overland Telegraph, Australian, and the House of Assembly, 158
Oxclose Colliery, Dronfield, Strike at, 68
Oxford Main Drainage, 174, 326

Pacific Railroad, Central, Traffic on the, 240
Pacific Steam Navigation Company and Milford Haven, 135
Papers, Social Science, 283
Paris, German Coal in, 228
Paris, Lyons, and Mediterranean Railway, Rolling Stock on the, 367
Paris Omnibuses, Revenue of, 88, 341
Paris, Street Architecture in, 191
Paris, Water Supply of, 412
Parisian Company for Lighting and Heating by Gas, Profits Realised by the, 288
Parkgate Iron Company's Annual Report, 381
Parkgate Iron Company, Meeting of the, 399
Parliamentary Bills, Scotch, 86, 157, 191
Parliamentary Paper on Patent Law Reform, 165
Parliamentary Report at the Meeting of the Clyde Trust, 400
Pas-de-Calais, Coal-Mining Operations in, 79
Patapsco River, Dredging the, 338
Patent Law Reform, 165
Patent Office Publications, Canadian, 288
Patent Pipe and Boiler Foundry Company, 75
Patents, American, 35
Pavements, Wooden, Proposed for Southampton, 88
Peat Fuel, Companies for the Manufacture of, in Dumfries, 346, 400
Peat Machinery, Clayton's, 381
Pembroke Dock, Arrival of Armour Plates at, 443
Pembroke Dock, The Thunderer at, 174
Pembroke Dockyard, Launch at, 152, 240
Pennsylvania Anthracite Coal, Increase in the Production of, 299
Pennsylvania, Discovery of Copper in, 254
Pennsylvania, Mineral Wealth of, 341
Pennsylvania, Proposed Erection of Steel Mill at, 255
Pennsylvania Railroad, Contemplated Additions to, 302
Pennsylvania Railroad, Increase of Capital for, 212
Pennsylvania Railroad, Revenue of, 7, 240
Persia, The Electric Telegraph in, 55

Petroleum, American, Yearly Export of, 158
Petroleum, Export of, from Philadelphia, 50, 360
Petroleum Trade in Canada, 55
Peruvian Railways, Progress of, 39, 228
Peruvian Telegraphy, 399
Philadelphia, Export of Petroleum from, 50, 360
Philadelphia, The Growth of, 55
Philadelphia, Steam Shipbuilding at, 412
Philadelphia, Wharf Improvements at, 192, 301
Philosophical Gunnery, 199
Philosophical Society of Glasgow, Meeting of, 86, 191, 270
Pier, Harbour, and Jetty, Opening of, at Ilfracombe, 401
Pig Iron in France, Total Production of, 228
Pig Iron Market, The Glasgow, 16, 35, 51, 67, 86, 105, 116, 135, 157, 174, 191, 211, 219, 246, 255, 270, 288, 303, 325, 340, 362, 380, 400, 423, 441, 461
Pipe and Boiler, Patent, Foundry Company, 75
Pipe-Founding Trade at Glasgow, State of the, 105
Plan for the Rebuilding of Boston, 326
Plant, Railway, at the Antipodes, 6
Plymouth Chamber of Commerce and State Railways, 105
Pneumatic Despatch at Washington, 472
Point St. Charles Docks, Progress of the, 265
Pontefract Water Works Reservoir, 399
Pontypool and Abersychan, Labour at, 300
Pontypool, Caerleon, and Newport Railway, Progress of the, 443
Pontypool, Commencement of the Race Works at, 401
Pontypool Iron and Tin-Plate Company, New Mill for the, 255
Pontypool, Price of Coal at, 183
Poole, Mr. J., Death of, 15
Population of Portugal, 39
Port Adelaide, Improvement of, by Dredging, 326
Port of Cardiff, Quantity of Coal Exported from, 255
Port Chalmers and Dunedin Railway, Progress of, 35, 118, 212
Port Glasgow Harbour, Proposed Purchase of by the Greenock Harbour Trust, 441
Port Jackson, New South Wales, Guns for the Defence of, 328
Port of Newport, Quantity of Coal Exported from, 255
Portishead and Bristol Railway, Pier, and Dock Company, Half-Yearly Meeting of, 174
Portsmouth Dockyard, Trial of an Ambulance Railway Carriage in, 88
Portsmouth, Railway Extensions at, 222
Portugal, The Population of, 39
Portuguese Telegraphy, Progress of, 260
Potteries, Shrewsbury and North Wales Railway, Progress of, 152
Presentation to Mr. H. W. Davis, Engineer to the Great Eastern Railway, 262
Presentation to Mr. W. C. Lang at Liverpool, 262
Price of Coke at Sheffield, The, 462
Prince Edward Island, Steam Communication with, 16, 462
Printing Office at Queensland, Tenders for a, 35
Professor of Mechanical Engineering in Cornell University, Appointment of a, 70
Professor Rankine, The Late, Tributes to the Memory of, 51
Profitable Concern, A, 461
Profits of Coalowners, 130
Progress in New Zealand, 7, 253, 333
Prospects of the Cleveland Iron Trade, 400
Prospectus of Swedish Iron and Rolling Stock Company, 287
Public Health Act, The, in Wales, 462
Public Works in Auckland, 15
Public Works in Egypt, 240
Public Works in France, 116
Public Works in New Zealand, 333
Public Works in South Australia, 181
Puddlers at Stockton, Strike of, 262, 288
Puddling Furnace, Danks's, 62, 108, 117, 194, 130
Pumps, Ships', for the Dutch Government, 246
Punching and Shearing Machine, Wilder's, 186

Quartz, Discovery of, in Alaska, 126
Quebec, Roads in the Province of, 368
Queensland, Another Discovery of Coal in, 133
Queensland Boring Machine, A, 219
Queensland, Completion of a Bridge at, 246
Queensland Lighthouses, Tenders Accepted for the, 288
Queensland, New South Wales, and Victoria Railway, Cost of the, 288
Queensland Northern Railway, Progress of, 270
Queensland Printing Office, Tenders for a, 35
Queensland Railway, Progress of, 67, 400, 444

Race Works, The, at Pontypool, Recommencement of, 401
Rail-Making in Belgium, 228
Railroad Bridges, American, 18
Railroad, The Northern Pacific, 7, 111, 118, 133, 270, 370, 423, 462
Railroad, The Pennsylvania, 7, 212, 240, 302
Railroad, The Union Pacific, Entire Cost of, 157
Railroad, Union Pacific, Great Snowstorms on the, 212
Railroad, Union Pacific, Net Earnings of the, 423
Railroad, The Union Pacific, State of, 412
Railroads Centring at St. Louis, Number of, 86
Railroads in Ohio, Extension of, 86
Rails, Belgian, 173, 228, 287, 326
Rails, Belgian, for Victoria, 173, 326
Rails in France, Quantity Exported from, 86
Rails, France, Return of the Quantity Used in, 173
Rails, Steel, on the Great Western of Canada, 270
Rails, Steel, in the United States, 367, 462
Rails for Turkey, Shipment of, from Newport, 200
Rails in the United States, Consumption of, 191
Rails in the United States, Quantity Produced, 118
Railway Across the Andes, Survey for, 444
Railway, Australian Trans-Continental, Prospects of, 7, 191, 228, 270
Railway, The Bombay, Baroda, and Central India, 462
Railway Bridge over the River Forth, Parliamentary Sanction for, 380
Railway, Brousse and Moudania, Inauguration of the, 368
Railway, The Canada Central, Extension of, 7
Railway, The Canadian Pacific, Proposed Contract for, 173
Railway Carriages, Company formed for Lighting with Tandy and Dryden's Lamps, 386
Railway, The Charentes, Progress of, 288
Railway, The Costa Rica, Progress of, 69
Railway, The East Gloucestershire, Opening of, 68
Railway Economy, Indian, 461
Railway Enterprise, 423
Railway, The Erie, Return of Rolling Stock Possessed by, 287
Railway Extensions at Portsmouth, 222
Railway, A Fortunate, 135
Railway, Great Southern of India, Progress of the, 389
Railway, Great Western of Canada, Gauge Changing on the, 368
Railway, The Great Western, Proposed Arrangement by, 15
Railway, The Great Western, Station Accommodation on, 174
Railway, Great Western, Strike on the, 423
Railway, Illinois Central, Extent and Expenses of the, 287
Railway Improvements in South Wales, 124
Railway, Inspection of the Ismidt and Scutari, 368
Railway, Intercolonial, Extra Claims by Contractors for the, 194
Railway, The Llanelly, and the Great Western, 35
Railway, London and North-Western, Proposed Extension of the, 401
Railway, The Mamoré and Madeira, Inspection of, 173
Railway Meeting, South Yorkshire, 158
Railway, The Midland, and Mr. Adams, 492
Railway, New, between Bathgate and West Calder, 340
Railway, The New Line of, from Glasgow to Kilmarnock, 441
Railway, Northern of France, Yearly Profits of, 317
Railway, The Northern of Queensland, Progress of, 199
Railway Offices, New, at Sheffield, 7
Railway, Orleans, Length of Line Completed, 367
Railway Plant at the Antipodes, 6
Railway Projects, New, in Scotland, 270
Railway, The Proposed Great Asian, 444
Railway, Proposed High-Level, Bound Dundee, 16
Railway, Proposed New, from Brighton, 341
Railway, Proposed Transandine, 16
Railway, The Sebastopol, Progress of, 278
Railway, The Severn Tunnel, Progress of, 377
Railway Sleeping Carriages for the North British Railway, 126
Railway, South Italian, Increase of Traffic on the, 86
Railway Station, New, for Cardiff, 377
Railway Station, New, at Middlesbrough, 186
Railway Station, New, near Sheffield, 68
Railway Station, Newport Joint, 222
Railway Station, Proposed New, at Greenock, 219
Railway Stations, Sheffield, Extension of the, 237
Railway Strategy, Russian, 287
Railway, The Taff Vale, 68
Railway, Taff Vale, Settlement of Dispute on the, 300
Railway Traffic, Welsh, 341
Railway, The Welland, Canada, Progress of, 35
Railway Working Charges, French, 341
Railways in Algeria, Loss on the, 336
Railways, Argentine, Progress of, 103, 174, 219, 266, 303, 400, 450
Railways, Australian, Progress of, 35, 104, 228, 368, 351
Railways in Bosnia, Surveys for, 130
Railways, Brazilian, Progress of, 51, 104, 301, 325
Railways, Canadian, Progress of, 7, 48, 54, 118, 133, 173, 228, 270, 288, 341, 444
Railways in Canterbury, New Zealand, Extension of, 86
Railways, Cheap Indian, 412
Railways, Chilian, Progress of, 15, 182
Railways, French, and their Coal Supply, 412
Railways, Indian, Sir Charles Trevelyan's Opposition to the Narrow Gauge, 328
Railways, Military, Utility of, 173
Railways in New South Wales, 67, 341
Railways, New Zealand, Tenders for, 384
Railways, Peruvian, Progress of, 39, 228
Railways, Progress of, in Ontario, 240
Railways, Queensland, Progress of, 67, 400, 444
Railways, Roumelian, Progress of, 8
Railways in Russia, Aggregate Receipts of, 176
Railways, Russian, Extent of, 118
Railways, South Australian, Surveys for, 133
Railways at Toronto, 27
Railways, Turkish, Progress of, 315
Railways, The Victorian Government, Receipts of, 35
Railways, Victorian, Progress of, 6, 35, 199
Railways, Wooden, in Canada, 75
Rankine, The Late Professor, Tributes to the Memory of, 51, 135
Ravensthorpe Main Drainage, 411
Reaney, Lee, and Company, Eldon Works, Sheffield, Meeting of Creditors, 317
Rebuilding Question, Great Progress in, 150
Receipts of the Ceinture Railway of Paris, 473
Receipts of the Central Pacific Railroad, 105
Receipts of the Messageries Maritimes, 412
Receipts of the Victorian Government Railways, 35
Recife and São Francisco Railway, Progress of, 240
Reduction in the Price of Coal in West Yorkshire, 317
Registration Bill for Trade Marks, 336
Regulation Act for Coal Mines, South Yorkshire, 219, 255
Reid, Mr. G. L., Testimonial to, at Hamilton, Ontario, 35
Removal of Offices of the Ebbw Vale Steel, Coal, and Iron Company, 462
Rents, House, Great Advance of, round Sheffield, 87
Report, Annual, of J. Brown and Co., Atlas Works, Sheffield, 443
Report, Annual, of C. Cammell and Co., Cyclops Works, Sheffield, 443
Report, Annual, of the Engineer to the Aberdeen Harbour Board, 35
Report, Annual, of the Parkgate Iron Company, 381
Report, Annual, of the Sheffield Water Works Company, 270
Report of the Avonside Engine Company, 240
Report of Engineers on the River Forth Railway Bridge, 380
Report, Half-yearly, on the Tay Bridge Works, 219
Report, Official, on Belgian State Railways, 389
Report, Parliamentary, at the Meeting of the Clyde Trust, 400
Report, Quarterly, of the Engineer to the Clyde Trust, 35
Report of Mr. Todd on the Australian Overland Telegraph, 270
Report of the Transandine Telegraph Company, 270
Report on the Widening of the North Bridge, Edinburgh, 255
Reservoir, Pontefract Water Works, 399
Resignation of General McClellan, 423
Returns of Cleveland Ironmasters' Association, 262
Returns of the Queensland Railways, 400
Revenue of the Paris Omnibus Company, 341
Revenue of the Victorian Railways, 462
Rhodes and Sons' New Colliery, Dronfield, Progress of, 341
Rhymney Railway Company, Special Meeting of, 443
Rhymney Railway, Locomotives for the, 124
Rhymney Railway, Threatened Strike of Signalmen on the, 401
Rhymney Valley, The Coal Trade in, 443
Rio de Janeiro Gas Company, Dividend of the, 288
Risca Coal and Iron Company and their Collieries, 377, 443
Risca, Houses to be Built at by the South Wales Coal Company, 462
Risca Steam Collieries, 211, 219
River Aire, Leeds New Bridge over the, Progress of, 310
River, The Colorado, 212
River Delaware, Proposed Improvement in the Navigation of the, 434
River Hudson, Proposed Improvement of the, 158
River Improvements, Bristol, 135
River Mississippi, Dredging the, 461
River Ohio, Improvement of the, 29
River Schuylkill, Another Bridge over the, 262
River Severn, Tunnelling the, 220, 286
River Tees, Great Improvements in the, 174
Road Steamers in Aberdeenshire, 16
Roads in the Province of Quebec, 368
Rock-cutting Apparatus, Major Beaumont's, Inspection of, 158
Rocky Mountain Tunnel, A, 444
Rolling Mill, A New American, 423
Rolling Steel Rails, Experiments on, in Philadelphia, 337
Rolling Stock for the Grand Trunk Railway, 7, 444
Rolling Stock on the Great Western Railway, Half-yearly Statement of the, 300
Rolling Stock on the Paris, Lyons, and Mediterranean Railway, 367
Rome, Plans for the Fortification of, 212
Roots's Patent Blower, Extensive Use of, 87
Rope-making, Wire, 52
Ross and Monmouth Railway, Trial Trip on the, 341
Rotherham Water Works, New Storage Reservoir, Dimensions of the, 341
Rotherham Water Works, Progress of the, 341, 399
Roumelian Railways, Progress of the, 8
Royal Engineers' Surveying Service, 152
Royal Mint, Retirement of Mr. J. Newton, from the, 103
Royal Scottish Society of Arts, Meetings of the, 51, 135, 191, 219, 303, 340
Royal United Service Institution, The, 36
Ruabon and Wrexham, Reduction in the Price of Coal at, 423
Ruhr Coal Basin, Germany, the Productions of, 50, 86
Russia, Aggregate Receipts of Railways in, 176
Russia, American Locomotives in, 228
Russia in the Black Sea, 396
Russia, Iron Industry in, 436
Russian Military Depot Established at Orel, 368
Russian Railway Strategy, 287
Russian Railways, The Extent of, 118
Russian Telegraph Stations, The Number of, 35

Sable Island, Nova Scotia, Erection of Lighthouse on, 300
St. Gothard Tunnel, Progress of, 118, 152, 228, 288, 368
St. Louis, The Great Railroad Centre to North America, 86
Sale of the Kelham Forge and Rolling Mills, Sheffield, 288
Sale, Proposed, of Caerphilly Colliery, 15
Salt, Indian, 444
Samana Bay Company, New Steamer for the, 347
Santos Docks, Extension of Time for the Completion of, 328
São Francisco and Recife Railway, Progress of the, 240
Savona and Turin Railway, Damaged by Floods, 50
Scales, Fairbank's, Ordered for the Russian Government, 389
Scarcity of Coal in Belgium, 295
Schultz Gunpowder Company, England, Application to Canadian Parliament, 228
Scientific and Mechanical Society, Manchester, Meeting of, 52, 75
Scotch Blast Furnaces, 51, 116, 303
Scotch Parliamentary Bills, 86, 157, 191
Scotland, Conference of the Coal Miners of, 116
Scotland, New Railway Projects in, 270
Scotland, Progress of the Coal Trade in, 270, 288, 325
Scutari and Ismidt Railway, Inspection of the, 368
Scutari, Omnibuses in, 368
Search for Coal in Victoria, 287
Searching for Ore on Maundown, 377
Sebastopol Railway, Progress of the, 278
Selkirk Gas Works, Extension of the, 423
Sermons, Lay, 211
Severn Commissioners, Meeting of the, 88
Severn, The River, Tunnelling of, 220
Severn Tunnel Railway, Progress of the, 377
Severn and Wye Railway and Canal, Progress of the, 174, 360
Sewage, Tottenham, 459
Sewerage in Buenos Ayres, 190
Sewerage in New York, 190
Shamrock and Hibernia Collieries, Westphalia, Sale of, 212
Shareholders, Meeting of, in Sheffield, 399
Sharpness Docks, Progress of the, 319
Sheffield, Another Advance in the Price of Coal at, 7, 105, 118, 174
Sheffield, Another Co-operative Undertaking at, 191
Sheffield Chamber of Commerce, Meeting of, 87
Sheffield District, Alterations of Works, &c., in the, 27, 87, 105, 174, 219, 255, 367, 381, 399, 423, 443, 462
Sheffield Engineering Trades, Agitation for Increase of Wages, 381
Sheffield File Trade, Strike in the, 317, 341
Sheffield, Formation of a Chemical Company at, 310
Sheffield, New Railway Offices at, 7
Sheffield, New Railway Station near, 68, 237
Sheffield Steel Manufacturers' Association, 116
Sheffield Tramways, 7, 237
Sheffield United Gas Light Company, Meeting of the, 288
Sheffield, Wages Agitation at, 105, 191, 211, 381, 423
Sheffield Water Works Company, Annual Report and Meeting of the, 270, 288
Sheffield Work in America, 27
Ship Canal, Cost of, from the Mississippi, 86
Ship Canal, The Nicaragua, Explorations for, 220
Ship Canal Question, The Darien, 18, 59
Shipbuilding, Cleveland, 7, 51, 86, 124, 130, 154, 186, 203, 245, 268, 310, 341, 400, 423
Shipbuilding at Philadelphia, Steam, 412
Shipbuilding Yard, New, at Greenock, 462
Shipbuilding Yard, Proposed Construction of, at Milford Haven, 103
Shipping Accommodation at Montreal, 444
Ships' Pumps for the Dutch Government, 246
Shrewsbury, Potteries, and North Wales Railway, Progress of the, 152
Sigl's Works, Vienna, Strike at, 265
Signal Light, The Westminster, 400
Signalling on the Great Western Railway, 152
Silber Light, The, 217
Silkstone and Dodsworth Coal and Iron Company, The, 310
Sleepers, Iron, Result of Trials on Belgian Railway, 360
Sleeping Carriages, for the North British Railway, 126
Small Arms, American, 118
Smoke Preventer and Fuel Economiser, A New, 51
Smyrna and Cassaba Railway, Extension of the, 303
Snow Drifts on the Intercolonial Railway, 303
Snow in the Far West, 135
Social Science Papers, 283
Society of Arts, Meeting of the, 174
Society of Arts, Royal Scottish, Meeting of the, 135, 191, 219, 303, 340
Society of Telegraph Engineers, The, 130
Somerset and Bristol Railway, Progress of the, 15, 35, 48, 269, 360
Somersetshire, Advance of Colliers' Wages in, 88
Somersetshire Coal Trade, The, 269
Somersetshire, More Coal Discovered in, 86, 124
Something Wrong Somewhere, 335
South America, Coal in, 7
South American Mining, 104
South American Railways, Great Extension of, 450
South Australia, Increased Production of Copper in, 270
South Australia, Public Works in, 181
South Australian Railways, Surveys for, 133
South Italian Railway, Increase of Traffic on the, 86
South Wales Atlantic Steamship Company, Cork Mattresses for the, 240
South Wales Atlantic Steamship Company, Launches for the, 157, 186

South Wales and Bristol Wagon Company, Dividend of the, 105
South Wales Coal Company, Houses to be Built by the, at Risca, 462
South Wales Coal Traffic on Railways, 269
South Wales House-Coal Colliers, Threatened Strike of, 240
South Wales, Labour in, 15, 43, 152, 186, 211, 240, 277, 319, 377
South Wales Mineral Railway, 286
South Wales, Railway Improvements in, 124
South Wales, Strike in, 62, 88, 105, 135, 300
South-Western and London Railway, Traffic Receipts, 105
South Yorkshire Colliers, Strikes of, 341, 381
South Yorkshire Colliery Undertakings and Alterations, 7, 31, 211, 270, 367, 381
South Yorkshire, Engineering Works in, 27, 191, 213, 237, 255, 310, 367, 381, 393, 423, 462
South Yorkshire, Important New Colliery in, 381
South Yorkshire and London Coal Traffic, 51, 118, 211, 270
South Yorkshire Miners' Association, Meeting of, at Barnsley, 191
South Yorkshire, Mining Institute and Schools Proposed in, 105
South Yorkshire, More New Collieries in, 270
South Yorkshire and the Question of Miners' Wages, 138
South Yorkshire Railway, Meeting, 138
South Yorkshire Undertakings, Dividends of, 118
Southampton Chamber of Commerce and Railway Communication, 377
Southampton Docks, Deepening of, 135
Spain, Herr Krupp in, 86
Spanish Ore Mines, 255
Speedy Stopping of Tramway Cars, 191
State Railways in England, 105
State Railways, German, Estimated Outlay for, 59
"States" Line of Transatlantic Steamers, Progress of the, 269
Station Accommodation on the Great Western Railway, 174
Stations, Telegraphic, Number of, in New Zealand, 367
Status of the Late Mr. J. Carmichael, of Dundee, 16
Statue, Bronze, of Sir J. Outram, 461
Steam Coal Colliers, Mountain Ash, Meeting of, 401
Steam Coal at Navigation, Cardiff, 186
Steam Coalowners, Meeting of, in South Wales, 68
Steam Collieries, Risca, 211, 219
Steam Colliers, Profits of, by the Philadelphia and Reading Railway Company, 118
Steam Communication with Prince Edward Island, 462
Steam Fire Engine for Greenock, Proposed Purchase of a, 270
Steam Fire Engine amongst the Mills, 18
Steam Gauge, An African, 55
Steam Launch Building at Cowes, 15
Steam Launches, Fast, Construction of, by J. Thorneycroft, 315
Steam Launches for the Royal Mail Steam Packet Company, 124
Steam Navigation, American, Progress of, 228, 326, 462
Steam Navigation, Argentine, 341
Steam Navigation Company, French Transatlantic, Revenue of, 153
Steam Navigation, Dutch, 423
Steam Navigation in the Mediterranean, 153
Steam Navigation, Transatlantic, Progress of, 191
Steam Power and Wheel Rents at Sheffield, Advance of, 118
Steam Road Metal Crusher, Marsden's, at Ayrshire Agricultural Show, 325
Steam Users' Association, Manchester, Meeting of the, 211
Steam Whistles, License for, at Portsmouth, 68
Steamboats, Great Western, Extension of, 186
Steamer for Japan, Constructed at Brooklyn, America, 262
Steamer, Large, Launch of, on the Clyde, 239
Steamers, The Allan Line of, Subsidy granted to by the Canadian Government, 314
Steamers, Light Draught, in Pennsylvania, 212
Steamers, New, built by Messrs. Pearse and Co., of Stockton, 68
Steamers, New Zealand, Official Return of, 412
Steamers, Number Employed between Europe and America, 368
Steamers, Road, in Aberdeenshire, 16
Steamship Building at Cowes, 68
Steamship Building at Philadelphia, 412
Steamship Cheviot, Sale of the, 377
Steamship Company, American, Progress of the, 286
Steamship Company, Nova Scotia, Proposed, 190
Steamship Company, South Wales Atlantic, Another Launch for, 126
Steamship Company, The Union, 68
Steel and Iron Institute, Meeting of, at Middlesbrough, 459
Steel and Iron Works, New, at Sheffield, 219
Steel Making, French, 449
Steel Manufacturers' Association, Sheffield, 118
Steel Mill, Proposed Erection of, at Penydarran, 255
Steel Rails, Experiments in Rolling, at Philadelphia, 237
Steel Rails for the Grand Trunk Railway, 341
Steel Rails on the Great Western of Canada, 270
Steel Rails on the Michigan Central Railway, 80
Steel Rails in the United States, 367, 462
Stobcross Dock, Progress of the, 105
Stoppage of Works in Cleveland, 423
Storage, Reservoir, New, for the Rotherham Water Works, Dimensions of the, 341
Strategy, Russian Railway, 207
Street Architecture in Paris, 191
Street Cleansing at New York, 6
Street Locomotion in New York, 444
Street Tramway Locomotives for the Santander Tramway Company, 303
Strike at the Bute Docks, 341
Strike of Colliers in the Forest of Dean, 255
Strike on the Great Western Railway, 423
Strike at Hopkins, Gilkes, and Co.'s Works, Middlesbrough, 174, 186, 209, 227, 310, 341, 367
Strike of Ironstone Miners, Middlesbrough, 7, 27
Strike at the Limestone Quarries, 341
Strike of Puddlers at Scockton, 262, 263
Strike in the Sheffield File Trade, 217, 341
Strike in South Wales, 68, 88, 105, 135, 300
Strike on the Tasmanian Main Line Railway, 117
Strike, Threatened, of the Signalmen on the Rhymney Railway, 401
Strike at the Weardale Limekilns, 283, 310, 315
Strikes of Colliers, South Yorkshire, 341, 381
Strobel, Major, Death of, 152
Submarine Cable Company, The Brazilian, 444
Subway Bill, The Clyde, Rejection of, 245
Suez Canal, The, 130, 240, 266, 270, 436
Sugar Refinery, Cappielow, Greenock, Progress of the, 270
Sugar Stores, Ground for Additional, at Greenock, 105
Sugar Trade in Greenock, Progress of the, 157
Sulphur Mine, Discovery of a, in Bosnia, 369
Surveying Service, The Royal Engineers', 152
Surveyor and Engineer for Norwich, Appointment of, 185
Surveys of New Zealand, 341
Surveys of Western Australian Railways, 35
Suspension Bridge, Completion of, in Japan, 181
Suspension Bridge, New, over the River Esk, 255
Sutherland and Caithness Railway, Progress of the, 283
Sutherland Coalfield, Striking Coal at the, 340
Swansea and Cardiff Steam Coal Company, The, 443
Swansea Graving Dock, 211
Swansea Water Supply, Meeting at Swansea, 222
Sweden, Discovery of Coal in, 240
Sweden, German Ironmasters in, 67
Swedish Iron and Rolling Stock Company, Prospectus of, 287
Swindon, Proposed New Bridge at, 153
Swinton, South Yorkshire, Meeting of Ironworkers at, 87
Sydney Town Hall (N.S.W.), Tenders for the Completion of, 6
Syra and the Island of Scio, Submarine Telegraph between, 135

Taff Vale, Coal Traffic over the, 124
Taff Vale Railway, 68
Taff Vale Railway, Judgment in the House of Lords, 341
Taff Vale Railway, Settlement of Dispute on the, 300
Tasmanian Coal and Iron, 284
Tasmanian Iron Ore, Extensive Discoveries of, 67, 156, 184, 219, 443
Tasmanian Main Line Railway, Navvies Imported for the, 288
Tasmanian Main Line Railway, Strike on the, 117
Tay Bridge, Progress of the, 116, 219
Technical Education in Scotland, 191
Tees Bridge Blast Furnaces, Increase of, 368
Tees, New Docks Proposed on the, 7, 124
Tees, The River, Great Improvements in, 174
Telegrams, in New South Wales, Reduction in the Price of, 315
Telegraph, Australian Overland, Commemoration of the Opening, 126
Telegraph, The Electric, in Persia, 55
Telegraph Engineers, The Society of, 130
Telegraph Stations, Russian, The Number of, 35
Telegraphic Enterprise, 43
Telegraphs in Australia, Return of the Length of, 178
Telegraphs in Chili, 55
Telegraphy, Australian, Progress of, 35, 86, 105, 126, 158, 173, 270, 412
Telegraphy, Brazilian, 400
Telegraphy in the East, 135
Telegraphy, Italian, 236
Telegraphy, New Zealand, 307, 472
Telegraphy, North Pacific, 7
Telegraphy, Nova Scotian, 7
Telegraphy, Peruvian, 399
Telegraphy, Portuguese, 260
Telegraphy, Success of the Duplex System at Sheffield, 270
Telegraphy, Transandine, 444
Telegraphy, West Indian, 9
Tenders Accepted for the Queensland Lighthouses, 283
Tenders for Gas at Adelaide, 228
Testimonial to R. C. Patterson by the Australian Overland Telegraph Party, 86
Testimonial to Mr. G. L. Reid, at Hamilton, Ontario, 35
Texas, Discovery of Coal in, 368
Thunderer, The, at Pembroke Dock, 174
Tin in New South Wales, 174
Tin Ore, Discovery of, in Tasmania, 444
Tin Plate in the South West, 401
Tin Works, Aberearn, 15
Tin Works, Abertillery, South Wales, Progress of the, 269, 423
Tin-plate Trade in the South-West, 186, 211, 240, 401
Titanic Steel and Iron Company, The New Zealand, 86
Tod and Macgregor, Extinction of the Firm of, 393
Top, An Automatic Chromatic, 8
Toronto, Grey, and Bruce Railway, Meeting of Proprietors, 86
Toronto, Railways at, 27
Tottenham Sewage, 459
Town Hall, Sydney (N.S.W.) Tenders for the Completion of the, 6
Town Improvements in New Zealand, 444
Traction Engine, Nairn's Patent, 35
Trade at Cardiff, 68, 269, 377
Trade Marks Registration Bill, 336
Trade at Merthyr Tydvil, 269, 377, 401
Trade at Montreal, 341
Trade at Newport, 35, 42, 168, 255, 443
Trade, The Tin-plate, in the South-West, 186, 211, 240, 401
Trades Union Congress at Leeds, 51, 68
Tradeston Flour Mills, Engineering Contract, 211
Train Mileage on the Great Western Railway, 186
Tramway Cars, Speedy Stopping of, 191
Tramway Dispute, A, 341
Tramway Locomotive, Street, for the Santander Tramway Company, 303
Tramways in Bristol, 43, 105, 462
Tramways in Cardiff, 68
Tramways in Constantinople, Progress of, 147, 239
Tramways, Dundee, and Mr. Page's Patent, 51
Tramways in Glasgow, 35
Tramways at Middlesbrough, 27
Tramways, Neath, Application to Parliament for, 211
Tramways in Sheffield, 7, 237
Tramways and Water Works at Dunedin, New Zealand, Progress of, 239
Transandine Railway, Proposed, 16
Transandine Telegraph Company, Report of the, 270
Transandine Telegraphy, Progress of, 444
Transatlantic Steam Navigation Company, The French, 412
Transatlantic Steam Navigation, American, Progress of the, 191
Transatlantic Steamers, "States" Line, Progress of the, 269, 338
Transcontinental Railway, Another, 7, 191, 228, 270
Transfers and Extensions in South Yorkshire, 443
Travelling from America, Proposed Arrangements for, 341
Trial Trip of an Emigrant Ship Built on the Tees, 450
Tributes, Additional, to the Memory of the late Professor Rankine, 144
Tunnel, The Hoosac, Progress of, 178
Tunnel, Proposed, under the River Missouri, 2
Tunnel through the Rocky Mountains, 444
Tunnel, The St. Gothard, Progress of, 118, 152, 228, 288, 368
Tunnel Works, The Tay Bridge, Dundee, Progress of the, 219
Tunnelling the Severn, 220, 286
Turin and Savona Railway Damaged by Floods, 50
Turkey, Shipment of Rails from Newport for, 300
Turkish Railways, Progress of the, 315
Tyne Bridge, The, Progress of, 62

Underviewers and Deputies, Meeting of, at Sheffield, 67, 156
Union Pacific Railroad, Great Snowstorms on the, 135, 212
Union Pacific Railroad, State of the, 412, 423
Union Pacific Railroad, Entire Cost of the, 157
Union Steamship Company's Steamer, Asiatic, Trial of the, 68, 105
United Gaslight Company, Bristol, Meeting of, 211
United States, Iron in the, 67
United States Navy, Addition to the, 35, 138, 326
United States, Quantity of Rails Produced in the, 118
United States, Rails Consumed in the, 191
United States, Total Production of Coal in the, 212
Universal Exhibition, The Vienna, 240, 460
Unstone District, Operations in the, 367
Unstone Moulds Colliery, Sale of the, 7
Unstone, near Sheffield, Coal-Getting at, 68
Utilisation of Blast Furnace Slag, 288

Vancouver's Island, Quantity of Coal Exported from, 402
Vaughan, Bolckow, and Co.'s, Middlesbrough, Application for Advance of Wages at, 315
Ventilating Fan, New Guibal, at Manver's Main Colliery, Wath, 27
Ventilation of Buildings, 459
Victoria, The Albert Graving Dock, Progress of, 368
Victoria, North-Eastern Railway of, 67
Victoria, Queensland, and New South Wales Railway, Cost of the, 288
Victoria, Search for Coal in, 287
Victoria, Value of Gold Exported from, 213
Victorian Breakwater, 162
Victorian Gas Coal, Specimens of, 412
Victorian Gold Mining, Number of Persons Engaged in, 287
Victorian Government Railways, Receipts of, 35
Victorian Locomotives, Banquet at Ballarat on the Completion of, 444
Victorian Locomotives, Manufacture of, at Ballarat, 302, 359, 444
Victorian Railways, Progress of, 6, 190, 462
Victorian Railways, Revenue of the, 402
Victorian Water Works, 86
Vieille Montagne Zinc Company, Operations of the, 451
Vienna Exhibition, The, 240, 460
Vienna, Strike at Sigl's Works at, 265
Visit of the Tyne Commissioners to Cardiff, 377

Wages Agitation at Sheffield, 106, 191, 211, 381, 479
Wages, Colliers', Advance of, at Sheffield, 110
Wages of the Engineers of the North, 268
Wages on the Great Western Railway, 186, 255
Wages, Locomotive, on the Great Indian Peninsula Railway, 462
Wages, Miners', and the Price of Coal at Sheffield, 174
Wagon Works, New, for Cardiff, 174, 186
Wales, The Great Western Railway Company in, 152
Wales, The Public Health Act in, 462
Warrant Stores, The Middlesbrough, 62
Washington, Pneumatic Despatch at, 472
Water Supply, The, of Constantinople, 35
Water Supply, Galashiels, 135
Water Supply of Montreal, 133, 174, 398
Water Supply of New York, Increase of, 7
Water Supply of Odessa, 35
Water Supply of Paris, The, 412
Water Supply, Swansea, Meeting Respecting the, 222
Water Supply for Wellington, New Zealand, 86
Water Supply, Yeovil, 135
Water Works, American, 212
Water Works, Chicago, Progress of, 412
Water Works Company, Bristol, Meeting of, 186
Water Works Contracts, Dundee, 51
Water Works, The Groton, New York, 6
Water Works, Geelong, Failure of, 212
Water Works, Glasgow, Mr. Gale's Quarterly Report on, 86
Water Works, Rotherham, Dimensions of New Storage Reservoir for the, 341
Water Works, Rotherham, Progress of the, 239, 341
Water Works Scheme, Doncaster, 68
Water Works, Pontefract, Reservoir for the, 239
Water Works and Tramways at Dunedin, New Zealand, Progress of the, 239
Weardale Lime Kilns, Strike at the, 283, 310, 315
Welland Canal, Engineers' Report of the, 212
Welland Canal, Inspection of the, 105
Welland Railway, Canada, Progress of the, 35, 105, 212
Wellington Bridge, Leeds, Dimensions of the, 87
Wellington Gas Company, New Zealand, Dividend of the, 310
Wellington, New Zealand, Water Supply for, 86
Welsh Coal Conveyed by the Great Western Railway, 211
Welsh Coal Mines, Number of Persons Employed in, 211
Welsh Opinion, A, of the Coal Question, 222
Welsh Railways, Progress of, 239
Welsh Railway Traffic, 341
West Calder and Bathgate, New Railway Between, 340
West of England, Mineral Property in the, 300
West Indian Telegraphy, 9
West of Scotland Association of Gas Managers, Meeting of, 212
Western Australia, Mining in, 462
Western Australia, The Population of, 444
Western Australia, Progress in, 402, 444
Western of France Railway Company, Outlay by the, 262
Westminster Signal Light, The, 460
Westport, New Zealand, Immense Discoveries of Coal at, 270
Westward Ho!, 15
Wet Dock at Fairfield, Messrs. Elder and Company's, and the Clyde Trust, 105
Wharf Improvements at Philadelphia, 192
Wharf, New, Building at Philadelphia, 301
Wharfage, Proposed Increase of, at the Port of Bristol, 35
Wheel Rents and Steam Power at Sheffield, Advance of, 118
Whistles, Steam, License for, at Portsmouth, 68
Wick Breakwater, 174
Wick Harbour Works, 67
Widening of Bristol Bridge, 423
Wigpool Iron Ore Company, 35
Wilder's Punching and Shearing Machine, 186
Wilson and Cammell's Works, near Sheffield, 217, 270
Wincanton, Price of Gas at, 152
Winding up of the Auckland Iron Company, 426
Winter in Nova Scotia, 86
Wire-Rope Making, 52
Wivelscombe and Yeovil, Reduction in the Price of Coal at, 255
Wonderful Model, A, 378
Wood-Cutting Machine, Ellis's, Inspection of, 150
Wooden Pavements, Proposal for, at Southampton, 86
Wooden Railways in Canada, 75
Working Men's Co-operative Iron Works at Sheffield, Commencement of, 105
Workman's Co-operative Coal Company at Maesteg, 105
Works, Bessemer in Australia, 76
Works, New Wagon, for Cardiff, 174, 186
Wright's Patent Air Gas, Exhibition of, 237
Wrexham and Ruabon, Reduction in the Price of Coal at, 423
Wrong Somewhere, Something, 323
Wrought Nail Works at Middlesbrough, Progress of the, 400
Wye and Severn, Railway and Canal, Progress of the, 174, 360

Yeddo, Japan, Completion of a Suspension Bridge at, 181
Yeovil Water Supply, 135
Yeovil and Wivelscombe, Reduction in the Price of Coal at, 255
Yorkshire Board of Examination under the Coal Mines Act, First Meeting of, 295
Young, Mr. J., to be made an F.R.S., 225

Zinc Company, The Vieille Montagne, Operations of, 451

LETTERS TO THE EDITOR.

AMERICAN Steamship Company, The—B. H. Bartol, 402
Ashcroft's "Pop" Safety Valve—A, 423

Blast Furnace Tuyeres—Alexander Dick, 117
Blast, Hot—Thomas Whitwell, 26
Blast Furnace Slag, Utilisation of—Franz Büttgenbach, 266
Bow and Stern Screw Ships—C. Graham Smith, 462
Break of Gauge, Indian—Hardy Wells, 183
Bridge Competition, The Neva—Whitaker and Perrett, 441
Broad Gauge v. Narrow—R. F. Fairlie, 152

Canals in India—An Indian Engineer, 433
Carriages, Sleeping—Through Passenger, 352
Cheap Railway Bridges—Audiamar, 462
Cheap Railway Bridges—Ewing Matheson, 450
Cheap Railway Bridges—Libra, 462
Chemical Salts, Drying—J. L. Scotland, 76
Cleveland District, The—John Westray, 76
Coal Economy—Lewis Olrick, 194
Communication, International—George Biddlecombe, 301
Compound Engine, The Field Direct Expansion—Edward Field, 441
Compound Engines—H., 266
Compound Engines—John Perry, 361
Compounding Mill Engines (A Disclaimer)—Lewis Olrick, 183
"Compounding" Old Steam Engines—W. J. Blackburn, 152
Corliss Valves—Monops, 262

De-sulphurising Iron—Edward Elliott, 352
Disclaimer, A—Lewis Olrick, 183
District, The Cleveland—John Westray, 76
Double-keeled Vessels—G. Watson, 130
Dry Bottoms, Oxide—Cyclops, 277, 295, 303, 359, 402
Dry Bottoms, Oxide—Edward Hutchinson, 295, 358, 377
Dry Bottoms, Oxide—William Corbett, 377
Drying Chemical Salts—J. L. Scotland, 76

Economy, Coal—Lewis Olrick, 194
Egg-shaped Sewers—Archd. B. Allan, 452
Egg-shaped Sewers—C. E. Hawkins, 396
Engine, The Fairlie—J. P. Luckraft, 183
Engine, The "Nolet"—Douglas and Grant, 219
Engineers in India—A Junglewallah, 183
Engineers' Prospects—Vernier, 7
Engines, Compound—H., 266
Engines, Compound—John Perry, 361
Engines, Fairlie—Robert F. Fairlie, 440
Engines, Straw-Burning and Steam-Jacketted Cylinders—Richard Garrett and Sons, 474
Expansion Valves—Marine Engineer, 262
Expansion Valves—M. E., 229
Expansion Valves—Thomas Mannock, 209, 240, 266
Expansively Working Steam—H. K. W., 229

Fairlie Engine, The—J. P. Luckraft, 183
Fairlie Engine v. the Meyer—Robert F. Fairlie, 48, 172
Fairlie Engines—Robert F. Fairlie, 440
Fairlie v. Meyer—A McDonnell, 183
Field Direct Expansion Compound Engine, The—Edward Field, 441
First and True Inventors—Peter Salmon, 131
Floating Derrick, The 100-Ton—James Drake, 463
Foundations, Pneumatic—James B. Eads, 337
Foundations, Pneumatic—W. A. Roebling, 458
Fuel Question, The Peat—Henry Clayton, Son, and Howlett, 302, 358
Fuel, Oil as a—James D. Churchill, 266
Fuel Question, The Peat—John Pinchbeck, 285, 359
Fuel Question, The Peat—J. P. M., 285, 359
Fuel Question, The Peat—J. M. C. Meadows, 330, 337, 376, 474
Fuel Question, The Peat—J. Leyster, 440
Fuel Question, The Peat—Pendennis, 285
Fuel Question, The Peat—Ralph Richardson, 377
Fuel Question, The Peat—G. Hahn Danchell, 277, 329, 399
Fuel Question, The Peat—Walter M. J. Campbell, 359, 399
Fuel Question, The Peat—W. Elsam, 330, 359
Fuel Question The Peat—William Kernaghan, 330

Glass Gauge Tubes—Franz Büttgenbach, 76
Goux System, The—John Hill, 262

Highland Railways, Our—Libra, 410, 463
Hot Blast—Thomas Whitwell, 26
House of Commons Signal Light, The—J. R. Wigham, 411

India, Canals in—An Indian Engineer, 433
India, Engineers in—A Junglewallah, 183
Indian Break of Gauge—Hardy Wells, 183
Information, Questionable—Adrian Visetelly, 237
Information, Questionable—F. S., 262
Information, Questionable—Marine Engineer, 237, 266
Information, Questionable—An Old Sea-Going Engineer, 352
Information, Questionable—Practical Engineer, 218, 262, 287
Information, Questionable—Tyne, 183, 210, 218
Information, Questionable—W. Sides, R. N., Mersey Railway, 301
Information, Questionable—Z., 210
International Communication—George Biddlecombe, 301
Inventions in Austria, Working Patented—Robertson, Brooman, and Co., 462
Inventors, First and True—Peter Salmon, 131
Iron, De-Sulphurising—Edward Elliott, 352
Iron, Purification of—Charles Ellison, 295
Irrigation, Italian—G. L. Calini, M.E., 299
Irrigation in Spain George Higgin, 175
Italian Irrigation—G. L. Calini, M.E., 299

Long Ships—Smith, 329

Machines, Slag—Charles Wood, 328
Machines, Slag—David Joy, 302
Mensuration—C. E. Hawkins, 396
Meyer v. Fairlie—A. McDonnell, 183
Meyer v. Fairlie Engine—Robert F. Fairlie, 48, 172
Mills, Reversing Rolling—Jeremiah Head, 389
Mills, Reversing Rolling—W. Schonheyder, 355, 434
Mines, Pumps in—Pumps, 130
Mont Cenis Tunnel, The—W. G., 237

Narrow v. Broad Gauge—R. F. Fairlie, 152
Narrow Gauge Railways—R. Price Williams, 441
Narrow Gauge Railways—Edmund Wragge, 130
Narrow Gauge Railways—Narrow Gauge, 422, 473
Neva Bridge Competition, The—Whitaker and Perrett, 441
"Nolet" Engine, The—Douglas and Grant, 219
North Sea Ship Canal—T. R. Winder, 49, 106

Oil as a Fuel—James D. Churchill, 266
100-Ton Floating Derrick, The—James Drake, 463
Oxide Dry Bottoms—Cyclops, 277, 295, 303, 359, 402
Oxide Dry Bottoms—Edward Hutchinson, 295, 358, 377
Oxide Dry Bottoms—William Corbett, 377

Paint, Salt Water—A Ship Painter, 359
Peat Fuel Question, The—Henry Clayton, Son, and Howlett, 302, 358
Peat Fuel Question, The—John Pinchbeck, 285, 359
Peat Fuel Question, The—J. P. M., 285, 359
Peat Fuel Question, The—J. M. C. Meadows, 330, 337, 376, 474
Peat Fuel Question, The—J. Leyster, 440
Peat Fuel Question, The—Pendennis, 285
Peat Fuel Question, The—Ralph Richardson, 377
Peat Fuel Question, The—T. Hahn Danchell, 277, 329, 399
Peat Fuel Question, The—Walter M. J. Campbell, 359, 399
Peat Fuel Question, The—W. Elsam, 330, 359
Peat Fuel Question, The—William Kernaghan, 330
Pneumatic Foundations—James B. Eads, 337
Pneumatic Foundations—W. A. Roebling, 458
"Pop" Safety Valve, Ashcroft's—A., 423
Prospects, Engineers'—Vernier, 7
Pumps in Mines—Pumps, 130
Pumps, Steam—M. R., 26
Purification of Iron—Charles Ellison, 295

Questionable Information—Adrian Visetelly, 237
Questionable Information—F. S., 262
Questionable Information—Marine Engineer, 237, 266
Questionable Information—An Old Sea-Going Engineer, 352
Questionable Information—Practical Engineer, 218, 262, 287
Questionable Information—Tyne, 183, 210, 218
Questionable Information—W. Sides, R.N., Mersey Railway, 301
Questionable Information—Z., 210

Railway Bridges, Cheap—Audiamar, 462
Railway Bridges, Cheap—Ewing Matheson, 450
Railway Bridges, Cheap—Libra, 462
Railway Co-operative Association (A Suggestion)—H. C. Coulthard, 76
Railways, Narrow Gauge—R. Price Williams, 441
Railways, Narrow Gauge—Edmund Wragge, 130
Railways, Narrow Gauge—Narrow Gauge, 422, 473
Railways, Our Highland—Libra, 410, 463
Reversing Rolling Mills—Jeremiah Head, 389
Reversing Rolling Mills—W. Schonheyder, 355, 434

Safety Valves—Expansion, 126
Salt Water Paint—A Ship Painter, 359
Screw Ships, Bow and Stern—C. Graham Smith, 462
Sectional Boilers, Water Tube—Query, 76
Sewage Utilisation—Charles E. Avery, 441
Sewage Utilisation in 1872—F. Target, 466
Sewers, Egg-Shaped—Archibald B. Allan, 452
Ship Canal, North Sea—T. R. Winder, 49, 106
Ship Surveying—Liverpool, 362
Ship Surveying—M., 376, 419
Ship Surveying—Observer, 325, 362, 441
Ship Surveying—A Reader, 299, 337
Ships, Long—Smith, 329
Ships of War, Steering—N. Scott Russell, 338
Signal Light, The House of Commons—J. R. Wigham, 411
Slag Machines—David Joy, 302
Slag Machines—Charles Wood, 328
Sleeping Carriages—Through Passenger, 352
Spain, Irrigation in—George Higgin, 175
Steam Engines, "Compounding" Old—W. Blackburn, 152
Steam Pumps—M. R., 26
Steamship Company, The American—B. H. Bartol, 402
Steering Ships of War—N. Scott Russell, 338
Straw-burning Engines, and Steam-jacketted Cylinders—Richard Garrett and Sons, 474
Suggestion, A—H. C. Coulthard, 76
Surveying, Ship—Liverpool, 362
Surveying, Ship—M., 376, 419
Surveying, Ship—Observer, 325, 362, 441
Surveying, Ship—A Reader, 299, 337
System, The Goux—John Hill, 262

Tubes, Glass Gauge—Franz Büttgenbach, 76
Tunnel, The Mont Cenis—W. G., 237
Tuyeres, Blast Furnace—Alexander Dick, 117

Utilisation of Blast Furnace Slag—Franz Büttgenbach, 266
Utilisation, Sewage—Charles E. Avery, 441
Utilisation of Sewage in 1872—F. Target, 466

Valve, Corliss—Monops, 262
Valves, Expansion—Marine Engineer, 262
Valves, Expansion—M. E., 229
Valves, Expansion—Thomas Mannock, 209, 240, 266
Valves, Safety—Expansion, 126
Vessels, Double-keeled—G. Watson, 130

Water Tube Sectional Boilers—Query, 76
Working Patented Inventions in Austria—Robertson, Brooman, and Co., 462
Working Steam Expansively—H. K. W., 229

INDEX.

ILLUSTRATED ARTICLES.

ADAMSON'S Process for the Extraction of Wood Fibre, at the Vienna Exhibition, 476
Air-Locks of the East River and St. Louis Bridges, Diagram of, 196
Amateur Designing; A 90 Horse Power Marine Boiler, 51
American Lighthouse at Race Rock; Eastern Entrance to Long Island Sound, 296
American Lighthouse at the "Thimble Shoal," Hampton Roads, Virginia, 296
American Reaping and Mowing Machines at the Vienna Exhibition, 88
American Ploughs at the Vienna Exhibition, 494
Anchor, Self-Moving, Greenslade's, 54
Ancient Lathe, An, 236
Ancient Moulds for Bronze Knives, at the Vienna Exhibition, 179
Apparatus for Cleaning Cards. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 289
Apparatus for Cutting Elliptical Grooves. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 308
Apparatus for Gas Analysis, 329
Apparatus for the Manufacture of Soda Water. By Dows, Clark, and Company, at the Vienna Exhibition, 193
Apparatus for Pneumatic Tubes, Crespin and Lapergne's, 208
Apparatus for Registering the Rise and Fall of the Tides, Designed by Mr. F. H. Reitz, Hamburg, at the Vienna Exhibition, 82, 84
Apparatus for Testing Lubricants, 92
Apparatus, Tilghmann's Sand Blast, 273
Apparatus for the Utilisation of Sewage, 131
Appleby's Overhead Travelling Cranes at the Middlesbrough Docks, 435
Aqueduct under the Kao River (Sone Canals), 313
Artificial Ice, Machine for Making. By Vaas and Littmann, Halle-on-the-Saale, Germany, at the Vienna Exhibition, 346, 347
Augsburg, Continuous Web-Printing Press, By the Maschinen-fabrik Augsburg, at the Vienna Exhibition, 22, 23
Augsburg, Horizontal Engine with Sulzer Valve Gear, By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 49
Austrian Compound Marine Engine, 140 Horse Power Nominal. By the Stabilimento Tecnico Triestino, Trieste, at the Vienna Exhibition, 467
Austrian State Railways, Two-Storied Third-Class Carriage for the. By the Hernalser Waggonfabriks-actien-Gesellschaft, Vienna, at the Vienna Exhibition, 428, 429
Automatic Boiler-Feeding Apparatus, By Roufosse, Houget, and Teston, Verviers, Belgium, at the Vienna Exhibition, 141
Automatic Whistle, Lartigue and Forest's. By MM. Digney Frères, Paris, at the Vienna Exhibition, 523
Aveling and Porter's Six-Horse Traction Engine and Crane, 104
Axle-Box for the Rolling Stock of the Madeira and Mamoré Railway, 502
Axle-Box, Standard, for Carriages and Wagons, Kaiser Ferdinand's Nordbahn, 201

Balanced Slide Valves, Dawes and Holt's, 514
Battery, Beetroot Diffusion. By the Maschinenbau-Actien Gesellschaft, Prague, at the Vienna Exhibition, 354, 355
Battery, Stanley's Portable, 16
Bavarian State Railways, Goods Locomotive for the. By T. A. Maffei, Munich, at the Vienna Exhibition, 247, 250
Bay of Dover, Map of, 130
Bay of Dover, Sketch of, in the time of Henry the Eighth, 185
Bede's Double-Boring and Facing Machine, at the Vienna Exhibition, 141, 144
Beetroot Diffusion Battery. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 354, 355
Beetroot Rolling Press, Wollmann's. By J. Aders, Neustadt-Magdeburg, at the Vienna Exhibition, 268, 269
Belgian Grand Central Railway, Express Locomotive for the, Diagrams of Working Gear for, 246
Bell's Machinery for Preparing Silk Waste, at the Vienna Exhibition, 255
Bergisch - Märkische Railway, Locomotive for the. By the Stettiner-Maschinenbau-Gesellschaft "Vulcan," near Stettin, at the Vienna Exhibition, 37, 38, 39
Bergmann's Patent High-Pressure Boiler at the Vienna Exhibition, 42, 43, 44
Bialon's Eight-Colour Perrotine Printing Machine, at the Vienna Exhibition, 471
Bialon's Quadruple Printing Press, at the Vienna Exhibition, 411
Birch's Stretching Machine for Textile Fabrics, at the Vienna Exhibition, 450
Blast Furnace. By F. Büttgenbach, Neuss, near Dusseldorf, Rhenish Prussia, 123
Blast Furnace at the Mariazell Iron Works, Styria, 174
Bohemian Ploughs, at the Vienna Exhibition, 527
Boiler, Bergmann's Patent High Pressure, at the Vienna Exhibition, 42, 43, 44
Boiler. By the Grazer Wagon Maschinenbau und Stahlwerks Gesellschaft, at the Vienna Exhibition, 162
Boiler and Engine, High Pressure. By R. Morell, Berne, Switzerland, at the Vienna Exhibition, 155
Boiler Explosion at Bradford, 149
Boiler-Feeding Apparatus. By Roufosse, Houget, and Teston, Verviers, Belgium, at the Vienna Exhibition, 141
Boiler and Feed Water Heater. By Sulzer Brothers, Winterthur, at the Vienna Exhibition, 280
Boiler Plate, Overheated, 54
Boiler for Goods Locomotive for the Bergisch-Märkische Railway. By Henschel and Son, Cassel, at the Vienna Exhibition, 74, 76
Boiler, Marine, A 90 Horse Power, Amateur Designing, 51
Boiler, Meyn's Patent. By the Actien Gesellschaft der Hollerschen Carlshütte, Rendsburg, at the Vienna Exhibition, 204
Boiler and Vertical Engine. By Davey, Paxman, and Company, Colchester, at the Vienna Exhibition, 292, 293
Boilers and Pumping Engines, Section and Plan of. By the Erste Brünner Maschinen-fabriks Gesellschaft, Brünn, at the Vienna Exhibition, 242
Boilers, Stationary. By Bolzano, Tedesco, and Company, Prague, at the Vienna Exhibition, 454
Bracing of Bowstring Girders under Rolling Loads, The, 263
Bradford, the Late Boiler Explosion at, 149
Brake Gear, Exter's Patent, at the Vienna Exhibition, 225
Brake, Langhof's, as used on the Kaiser Ferdinand's Nordbahn, 200
Breakwater, The Holyhead, 252, 254
Breechloading Gun and Carriage, Long 30½-Centimetre (12 in.), for Coast Defence. By F. Krupp, Essen, at the Vienna Exhibition, 168
Brick-Making Machine, Morand's. By T. S. Dersham, Leeds, at the Vienna, Exhibition, 413
Bridge, The East River, 217
Bridge Ferry, Proposed, over the River Tees, at Middlesbrough, 60
Bridge, Plan of the New Leeds, 9, 64
Bridge over the River Ouse at Lynn, Brunless and McKerrow, Engineers, 463
Brinkmann's High-Speed Steam Hammer, at the Vienna Exhibition, 362
Brotherhood's Three - Cylinder Engines and Helical Pumps, at the Vienna Exhibition, 264, 265
Buffer with Cast-Iron Casing, as used on the Kaiser Ferdinand's Nordbahn, 201
Buffer, Wrought Iron, for Carriages, as used on the Kaiser Ferdinand's Nordbahn, 200
Büttgenbach's Blast Furnace, 123

Calendering Machine for Woollen Fabrics, By A. Kiessler, Zittau, at the Vienna Exhibition, 447
Calico-Drying Machines. By A. Kiesaler, Zittau, at the Vienna Exhibition, 417
Caloric Motor, New. By F. Siemens, Dresden, at the Vienna Exhibition, 350
Canals, The Sone, 219, 220, 221, 312, 313
Carding Machines for Wool. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 289
Carl Ludwigs-Bahn, Locomotive and Tender for the. By Herr E. Kessler, Esslingen, at the Vienna Exhibition, 112, 113
Carriage, First-Class, for the Carl Ludwig's Railway of Austria. By F. Ringhofer, Smichow, near Prague, at the Vienna Exhibition, 511
Carriage, First-Class, Details of. By the Grazer Maschinenbau Waggon und Stahlwerks Gesellschaft, Graz, at the Vienna Exhibition, 249
Carriage, Saloon, for the Kaiserin Elisabeth Railway. By the Bubna Wagon Works, near Prague, at the Vienna Exhibition, 517
Carriage, Sleeping. By the Hernalser-Waggonfabriks-Gesellschaft, Vienna, at the Vienna Exhibition, 406, 407
Carriage, Sleeping, for the Kaiser Ferdinand's Nordbahn, at the Vienna Exhibition, 156, 159
Carriage Window, Langhof's, as used on the Kaiser Ferdinand's Nordbahn, 201
Cast Iron Cased Buffer, as used on the Kaiser Ferdinand's Nordbahn, 201
Cattle Wagon, Covered. By the Bubna Wagon Works, near Prague, at the Vienna Exhibition, 72
Circular Planing Machine. By Ganz and Company, Buda, Hungary, at the Vienna Exhibition, 301
Claparède's Goods Locomotive for the Paris and Orleans Railway at the Vienna Exhibition, 442, 443
Clayton and Shuttleworth's Plough at the Vienna Exhibition, 528
Cleaning Cards, Apparatus for. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 289
Coast Defence, Gun and Carriage, Long 30½-Centimetre (12 in.). By F. Krupp, Essen, at the Vienna Exhibition, 168
Coast Defence, Krupp's 28-Centimetre Howitzer for, at the Vienna Exhibition, 222, 223
Colour-Printing Press, Lithographic. By P. Swiderski, Leipzig, at the Vienna Exhibition, 55
Combined Reaping and Mowing Machine, Backeye Patent, at the Vienna Exhibition, 88
Combined Stone Breaker and Engine. By H. R. Marsden, Leeds, 429
Composite Carriage for the Kaiser Ferdinand's Nordbahn, Austria. By F. Ringhofer, Smichow, near Prague, at the Vienna Exhibition, 488
Compound Engine, The "Dingler." By the Dingler'schen Maschinen-fabrik, Zweibrücken, at the Vienna Exhibition, 163
Compound Engine, Horizontal. By the Görlitzer Maschinenbau Anstalt, Görlitz, at the Vienna Exhibition, 61
Compound Engine, Vertical. By Schneider and Company, Creusot, at the Vienna Exhibition, 514, 515
Compound Engine with Wood's Corliss Valve Gear, Details of. By J. E. Wood, Bolton, 420, 421, 422
Compound Marine Engine, 140 Horse Power Nominal. By the Stabilimento Tecnico Triestino, Trieste, at the Vienna Exhibition, 462
Condensing Engine, Horizontal. By Sulzer Brothers, Winterthur, at the Vienna Exhibition, 281, 282
Condensing Engine, Horizontal, Details of. By Bede and Co., Verviers, Belgium, at the Vienna Exhibition, 26, 27
Continental Stationary Engines, 375
Continuous Web Printing Press. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 22, 23
Cord-Making Machine. By G. Stein, Berlin, at the Vienna Exhibition, 359
Cotton Mill near St. Petersburg, Model of a 1200 Horse Power Turbine for. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 8, 9
Covered Goods Wagon. By the Bubna Wagon Works, near Prague, at the Vienna Exhibition, 72
Covered Goods Wagon for the Ebensee-Ischl-Steger Railway, Austria. By the Hernalser-Waggon-Fabriks-Actien-Gesellschaft, Vienna, at the Vienna Exhibition, 469
Covering and Twisting Machine. By G. Stein, Berlin, at the Vienna Exhibition, 358
Crane, Hand Travelling. By the Chemnitzer Werkzeugmaschinen - fabrik, at the Vienna Exhibition, 384
Crane, Overhead Travelling. By L. Stuckenholz, Wetter-on-the-Ruhr, Westphalia, at the Vienna Exhibition, 118
Crane and Traction Engine, Six-horse, Aveling and Porter's, 104
Crane, Two-ton Steam Travelling. By J. H. Wilson and Co., Liverpool, at the Vienna Exhibition, 394
Cranes, Derrick, A Caution in the Use of, 289
Cranes, Overhead Travelling, at the Middlesbrough Dock. By Appleby Brothers, London, 435
Crank-Pin Turning Machine, Portable. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 490
Craping and Folding Machines for Textile Fabrics at the Vienna Exhibition, 451
Crespin and Lapergne's Relay Apparatus for Pneumatic Tubes, 208
Cupola Furnaces, 459
Curves, Steam Expansion, 382
Cutting Elliptical Grooves, Apparatus for. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 308
Cylinders, Steam-Jacketted, 34, 54, 103

Davey, Paxman, and Co.'s Feed-Water Heaters, 92, 510
Davey, Paxman, and Co.'s Vertical Engine and Boiler at the Vienna Exhibition, 292, 293
Davies' Steam Striker, at the Vienna Exhibition, 180, 181
Decker's Direct-Acting Pumping Engine at the Vienna Exhibition, 367, 370, 371
Derrick Cranes, A Caution in the Use of, 289
Designing, Amateur; A 90 Horse Power Marine Boiler, 51
Details of Beetroot Diffusion Battery, By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 354, 355
Details of Compound Engine with Wood's Corliss Valve Gear. By J. and E. Wood, Bolton, 420, 421, 422
Details of First-Class Carriage. By the Grazer Maschinenbau Waggon und Stahlwerks Gesellschaft, Graz, at the Vienna Exhibition, 248
Details of Horizontal Condensing Engine. By Bede and Co., Verviers, Belgium, at the Vienna Exhibition, 26, 27
Details of Horizontal Engine, By C. Reinecke, Königsberg, at the Vienna Exhibition, 108, 109
Details of Locomotive for the Bergisch-Märkische Railway, Constructed by the Stettiner-Maschinenbau-Gesellschaft "Vulcan," near Stettin, at the Vienna Exhibition, 37, 38, 39
Details of Railway Carriages at the Vienna Exhibition, 200, 201
Details of Shearing Machine. By the Friedrich Wilhelms-hütte Iron and Mining Company, Mulheim-on-the-Ruhr, Rhenish Prussia, 77, 80, 81
Details of Water Tower. By the Erste Brünner Maschinen-fabrik Gesellschaft, at the Vienna Exhibition, 169
Diagram of Air-Locks of the East River and St. Louis Bridges, 196
Diagrams, Indicator, 293, 334
Diffusion Battery, Beetroot. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 354, 355
"Dingler" Compound Engine, The. By the Dingler'schen Maschinen-fabrik Zweibrücken, at the Vienna Exhibition, 163
Direct-Acting Pumping Engine. By Decker Brothers, Canstatt, Würtemburg, at the Vienna Exhibition, 367, 370, 371
Distributing Machine, Gebauer's. By the Actien-Gesellschaft für Stickfärberei, Appretur und Maschinenfabrication, Charlottenburg, near Berlin, at the Vienna Exhibition, 416
Dividing and Wheel-Cutting Machine. By the Chemnitzer Werkzeugmaschinen-fabrik at the, Vienna Exhibition, 380
Double-Acting Steam Hammer. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 17
Double-Boring and Facing Machine. By Bede and Company, Verviers, Belgium, at the Vienna Exhibition, 141, 144
Double-Bogie Locomotive (Fairlie's Patent) for the Iquique Railway, Peru. By the Avonside Engine Company, Bristol, 288, 298
Double-Bogie Locomotive (Meyer's System). By the Compagnie Belge, Brussels, at the Vienna Exhibition, 36
Double-Drilling Machine. By Pfaff, Fernau, and Company, Vienna, at the Vienna Exhibition, 4
Double-Furrow Plough, Ransomes', at the Vienna Exhibition, 456, 459
Double Shaping Machine. By the Werkzeugmaschinen-fabrik Saxonia, Chemnitz, at the Vienna Exhibition, 362
Dover Bay, Map of, Showing Proposed Harbour Schemes, 130
Dover Bay, Sketch of, in the Time of Henry the Eighth, 185
Dover Harbour; Plans of Authorised and Proposed Schemes, 184
Dover Harbour Works, Proposed New; Plan Proposed by Colonel Sir A. Clarke, 166
Dows, Clarke, and Company's Soda-Water Machinery at the Vienna Exhibition, 193
Drill, Wall. By the Berliner Eisengiesserei und Werkzeugmaschinen - fabrik, Berlin, at the Vienna Exhibition, 92
Drilling Machine, Double. By Pfaff, Fernau, and Company, Vienna, at the Vienna Exhibition, 4
Drilling Machine, Radial. By Lowry and Company, Salford, Manchester, 286
Drilling Machine, Ball. By Wagner and Company, Dortmund, Westphalia, at the Vienna Exhibition, 187

Drilling Machine, Slot. By the Werkzeugmaschinen-fabrik Saxonia, Chemnitz, at the Vienna Exhibition, 347
Drying Machine, Calico. By A. Kiessler, Zittau, at the Vienna Exhibition, 417
Ducommun's Stretching Machine for Textile Fabrics at the Vienna Exhibition, 450
Dudgeon's Rotary Engine, 396, 399
Duncan and Wilson's Printing and Folding Machine, The "Victory." By the "Victory" Company, Liverpool, at the Vienna Exhibition, 100, 101
Dwelling Houses, Iron. By S. C. Hemming and Company, at the Vienna Exhibition, 410
Dynamic Electricity, Apparatus for. By Mr. Stanley, 16

Early Sewing Machine, An, 321
East River Bridge, Tip Wagon at the, 217
Ehrhardt's Compound Engine, The "Dingler," By the Dingler'schen Maschinen-fabrik Zweibrücken, at the Vienna Exhibition, 163
Eight Centimetre (3.15 in.) Field Gun, with Iron Carriage. By F. Krupp, at the Vienna Exhibition, 506
Eight-Colour Perrotine Printing Machine. By C. Baion (late C. Hummel), Berlin, at the Vienna Exhibition, 471
Eight-Coupled Goods Locomotive for the Kaiserin Elisabeth Railway of Austria. By the Sächsische Maschinen-fabrik zu Chemnitz, Chemnitz, at the Vienna Exhibition, 136
Electrotyping Machine at the Vienna Exhibition, 425
Elliptical Grooves, Apparatus for Cutting. By the Sächsische Maschinen-fabrik Chemnitz, at the Vienna Exhibition, 308
Engine and Boiler, High-Pressure. By B. Morell, Berne, Switzerland, at the Vienna Exhibition, 155
Engine, Compound Marine, 140 Horse Power Nominal. By the Stabilimento Tecnico Triestino, Trieste, at the Vienna Exhibition, 462
Engine, Compound Vertical. By Schneider and Co., Creusot, at the Vienna Exhibition, 514, 515
Engine, Direct-Acting Pumping. By Decker Brothers, Canstatt, Würtemburg, at the Vienna Exhibition, 367, 370, 371
Engine, Fowler's Steam Ploughing, at the Smithfield Club Show, 480, 481
Engine, Horizontal Compound. By the Görlitzer Maschinenbau Anstalt, Gorlitz, at the Vienna Exhibition, 61
Engine, Horizontal Condensing. By Sulzer Brothers, Winterthur, at the Vienna Exhibition, 281, 282
Engine, Horizontal Condensing, Details of. By Bede and Company, Verviers, Belgium, at the Vienna Exhibition, 26, 27
Engine, Horizontal. By C. Beinecke, Königsberg, at the Vienna Exhibition, 108, 109
Engine, Horizontal Non-Condensing. By the Berliner Union Actien Gesellschaft, Berlin, at the Vienna Exhibition, 498, 500
Engine, Horizontal Non-Condensing. By Pickering and Davis, Portland, Conn., U.S., at the Vienna Exhibition, 455
Engine, Horizontal, with Sulzer Valve Gear. By the Maschinen-fabrik, Augsburg, Bavaria, at the Vienna Exhibition, 46
Engine, Rotary. By B. Dudgeon, New York, 396, 399
Engine, Shunting, for the Kaiser Ferdinand's Nordbahn, at the Vienna Exhibition, 519
Engine, Steam Fire. By Merryweather and Sons, London, at the Vienna Exhibition, 57
Engine, Vertical, and Boiler. By Davey, Paxman, and Company, Colchester, at the Vienna Exhibition, 292, 293
Engine Wheels, Locomotive, 15
Engines, Pumping. By the Erste Brünner Maschinen-fabriks Gesellschaft, Brünn, at the Vienna Exhibition, 242
Engines, Steam Fire, Shand and Mason's at the Vienna Exhibition, 96, 258, 259
Engines, Three-Cylinder, and Helical Pumps. By Brotherhood and Hardingham, London, at the Vienna Exhibition, 264, 265
Engleith and Cänner's Shearing and Punching Machine, at the Vienna Exhibition, 159
EXHIBITION, THE VIENNA:
Illustrations, 4, 5, 6, 9, 16, 17, 19, 22, 23, 26, 27, 35, 37, 38, 39, 42, 43, 44, 46, 55, 57, 61, 69, 72, 73, 74, 76, 77, 80, 81, 84, 88, 93, 96, 97, 100, 101, 108, 109, 113, 115, 118, 119, 122, 123, 133, 136, 137, 140, 141, 144, 153, 155, 158, 159, 162, 163, 177, 178, 179, 180, 181, 188, 193, 197, 199, 200, 201, 204, 205, 206, 216, 224, 225, 226, 228, 232, 233, 236, 237, 242, 243, 246, 247, 248, 250, 255, 258, 259, 262, 264, 265, 268, 269, 272, 273, 280, 281, 282, 284, 285, 288, 289, 292, 293, 301, 304, 308, 309, 312, 313, 316, 317, 324, 325, 329, 331, 334, 335, 338, 339, 346, 347, 350, 351, 354, 355, 358, 359, 362, 366, 367, 370, 371, 373, 376, 377, 378, 380, 384, 385, 388, 390, 391, 393, 394, 395, 396, 398, 399, 406, 407, 410, 411, 413, 416, 417, 420, 421, 425, 428, 429, 434, 442, 443, 444, 447, 450, 451, 454, 458, 459, 462, 470, 471, 473, 476, 477, 488, 489
Agricultural Implements, 69, 88, 458, 459, 473, 494, 495, 527, 528
Art Castings, 73, 74
Hydraulic Motors, 390, 391
Iron Manufacture, 19, 97, 99, 179, 253, 309
Locomotives, 37, 38, 39, 74, 76, 136, 224, 225, 226, 228, 247, 248, 250, 334, 335, 354, 355, 442, 443, 444, 518, 519
Ordnance, 153, 188, 252, 253, 331, 376, 377, 378, 505, 506, 507
Paper Manufacture, 476, 477
Railway Rolling Stock, 158, 159, 199, 200, 201, 317, 408, 407, 428, 429, 488, 489, 511
Science Exhibits, 177, 178, 305, 306, 425, 490, 523,
Soda Water Machinery, 193
Stationary Engines, 5, 267
Textile Industry, 221, 239, 272, 273, 288, 289, 295, 309, 360, 359, 360, 373, 416, 417, 447, 450, 451, 470, 471
Expansion Links, 103
Explosion of Boiler at Bradford, 149
Express Locomotive. By the Société Alsacienne de Constructions Mécaniques, Mulhouse, at the Vienna Exhibition, 384, 385
Express Locomotive for the Grand Central Railway of Belgium. By the Société Anonyme de Marcinelle et Couillet, at the Vienna Exhibition, 246
Express Locomotive for the Southern Railway of Austria. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 5
Extension of Leith Dock, Map of, 213
Exter's Patent Brake Gear, at the Vienna Exhibition, 225

Facing and Boring Machine, Double. By Bede and Company, Verviers, Belgium, at the Vienna Exhibition, 141, 144
Fairlie's Double-Bogie Locomotive for the Iquique Railway, Peru. By the Avonside Engine Company, Bristol, 395, 396
Feeding Apparatus, Boiler. By Boufosse, Houget, and Teston, Verviers, Belgium, at the Vienna Exhibition, 141
Feed-Water Heater and Boiler. By Sulzer Brothers, Winterthur, at the Vienna Exhibition, 280
Feed-Water Heaters. By Davey, Paxman, and Company, Colchester, 92, 510
Ferry Bridge, Proposed, over the River Tees, at Middlesbrough, 60
Field Gun, 8-Centimetre (3.15 in.), with Iron Carriage. By F. Krupp, Essen, at the Vienna Exhibition, 506
Fifteen-Centimetre (5.9 in.) Long Gun, with Broadside Carriage. By F. Krupp, Essen, at the Vienna Exhibition, 507
Fifteen-Centimetre (5.9 in.) Siege Gun. By F. Krupp, Essen, at the Vienna Exhibition, 503
Fire Engine, Steam. By Merryweather and Sons, London, at the Vienna Exhibition, 57
Fire Engines, Steam. By Shand and Mason, London, at the Vienna Exhibition, 96, 258, 259
"Firefly," The, Steam Launch. By J. I. Thornycycroft and Company, Chiswick, 236
First-Class Carriage for the Carl Ludwig's Railway of Austria. By F. Ringhoffer, Smichow, near Prague, at the Vienna Exhibition, 511
First-Class Carriage, Details of. By the Grazer Maschinenbau Waggon und Stahlwerks Gesellschaft, Graz, at the Vienna Exhtbition, 243
Flues, Overheated Boiler, 34
Folding Machine for Textile Fabrics. By the Charlottenburg Action Gesellschaft für Stuckfarberei und Maschinenbau, at the Vienna Exhibition, 451
Folding and Printing Machine, The "Victory." By the "Victory" Company, Liverpool, at the Vienna Exhibition, 100, 101
Fouracres' Head Sluices for the Sone Canals, 219, 220, 221
Fowler's Steam Ploughing Engine at the Smithfield Club Show, 480, 481
Frame, Warping. By the Erste Brünner Maschinen-fabriks Gesellschaft, Brünn, at the Vienna Exhibition, 239
Furnace, Blast, at the Mariazell Iron Works Styria, 174
Furnace, Blast, "Büttgenbach's System," 123
Furnaces, Cupola, 459

Ganz's Circular Planing Machine, at the Vienna Exhibition, 301
Ganz's Parquetry Machine, at the Vienna Exhibition, 393, 394
Gas Analysis, Apparatus for, 329
Gear for Corliss Engines, Patent Valve, Wanieck and Koppner's, at the Vienna Exhibition, 380
Gear for Corliss Engines, Beinecke's, 109
Gear for Corliss Engines, Wood's, 420, 421
Gebauer's Distributing Machine. By the Actien-Gesellschaft für Stückfarberei, Appretur und Maschinenfabrication, Charlottenberg, near Berlin, at the Vienna Exhibition, 416
German Ploughs, at the Vienna Exhibition, 494, 495
Gimson's Tar Pumps at the Stalybridge Gas Works, 329
Girders, Bowstring, The Bracing of, under Rolling Loads, 263
Goods Locomotive for the Bavarian State Railways. By Herr T. A. Maffei, Munich, at the Vienna Exhibition, 247, 250
Goods Locomotive Boiler, for the Bergisch-Märkische Railway. By Henschell and Son, Cassel, at the Vienna Exhibition, 74, 76
Goods Locomotive for the Paris and Orleans Railway. By Ciaparède and Co., St. Denis, at the Vienna Exhibition, 442, 443
Goods Locomotive for the Kaiserin Elisabeth Railway of Austria. By the Sachsische Maschinen-fabrik zu Chemnitz, Chemnitz, at the Vienna Exhibition, 136
Goods Locomotive for the Southern Railway of Austria. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 224
Goods Locomotive for the Southern Railway of France. By Schneider and Co., Creusot, at the Vienna Exhibition, 334, 335
Goods Locomotives for the Kaiser Ferdinand's Nordbahn. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 518
Goods Wagon, Covered. By the Bubna Wagon Works, near Prague, at the Vienna Exhibition, 72
Goods Wagon, Covered, for the Ebensee-Ischl-Steger Railway, Austria. By the Hernalser-Waggon-Fabriks-Actien-Gesellschaft, Vienna, at the Vienna Exhibition, 489
Gorlitzer Horizontal Compound Engine, at the Vienna Exhibition, 61
Grand Central Railway of Belgium, Double-Bogie Locomotive (Meyer's System), for the. By the Compagnie Belge, Brussels, at the Vienna Exhibition, 35
Greenslade's Self-Moving Anchor, 54
Grooves, Elliptical, Apparatus for Cutting. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 308
Grover's Spring Washer, 43
Gun and Carriage for Coast Defence, Long 30½-Centimetre, (12-in.). By F. Krupp, Essen, at the Vienna Exhibition, 188
Gun and Carriage, Naval, Long 24-Centimetre (9.448 in.). By F. Krupp, Essen, at the Vienna Exhibition, 153
Gun, Field, 8-Centimetre (3.15 in.), with Iron Carriage. By F. Krupp, Essen, at the Vienna Exhibition, 506
Gun with Naval Carriage, 12-Centimetre. By F. Krupp, Essen, at the Vienna Exhibition, 510
Gun, Naval, 26-Centimetre. By F. Krupp, Essen, at the Vienna Exhibition, 331
Gun, Siege, 21-Centimetre, (8.268 in.). By F. Krupp, Essen, at the Vienna Exhibition, 376, 377
Gun, Long 15-Centimetre (5.9 in.), with Broadside Carriage. By F. Krupp, Essen, at the Vienna Exhibition, 507
Gun, Siege, 15-Centimetre (5.9 in.). By F. Krupp, Essen, at the Vienna Exhibition, 503
Gutter or Ridge Tiles, Press for. By E. Lacis and Company, Trier, Rhenish Prussia, at the Vienna Exhibition, 115

Hallström's Vacuum Pan for Crystallising Sugar, at the Vienna Exhibition, 140
Hammer, Double-Acting Steam. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 17
Hammer, High-Speed Steam. By G. Brinkmann and Company, Witten-on-the-Ruhr, Westphalia, at the Vienna Exhibition, 362
Hammer, 3-Cwt. Steam. By the Kirkstall Forge Company, Leeds, at the Vienna Exhibition, 119
Hand-Travelling Crane. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 284
Harbour, Dover; Plans of Authorised and Proposed Schemes, 184
Harbour Schemes, Dover, Map of Proposed, 130
Harbour Works at Dover, Proposed New; Plan Prepared by Colonel Sir A. Clarke, 166
Hawksley's Boiler Flues, 34
Head Locks of the Sone Canals, 312
Head Sluices of the Sone Canals, Fouracres', 219, 220, 221
Heaters, Feed-Water, Davey, Paxman, and Company's, Colchester, 92, 510
Heavy Goods Locomotive for the Southern Railway of France. By Schneider and Company, Creusot, at the Vienna Exhibition, 334, 335
Hemming and Co.'s Workmen's Houses, at the Vienna Exhibition, 410
Henschel's Goods Locomotive Boiler, for the Bergisch-Märkische Railway, at the Vienna Exhibition, 74, 76
High-Pressure Boiler, Bergmann's Patent, at the Vienna Exhibition, 42, 43, 44
High-Pressure Boiler, Meyn's Patent. By the Actien Gesellschaft der Hollerschen Carlshütte, Rendsburg, at the Vienna Exhibition, 204
High-Pressure Engine and Boiler. By B. Morell, Berne, Switzerland, at the Vienna Exhibition, 155
High-Speed Steam Hammer. By G. Brinkmann and Company, Witten-on-the-Ruhr, Westphalia, at the Vienna Exhibition, 362
Holyhead Breakwater, Section and Plan of, 253 254
Horizontal Compound Engine. By the Görlitzer Maschinenbau Anstalt, Gorlitz, at the Vienna Exhibition, 61
Horizontal Condensing Engine. By Sulzer Brothers, Winterthur, at the Vienna Exhibition, 281, 282
Horizontal Condensing Engine, Details of. By Bede and Co., Verviers, Belgium, at the Vienna Exhibition, 26, 27
Horizontal Engine. By C. Beinecke, Königsberg, at the Vienna Exhibition, 108, 109
Horizontal Engine with Sulzer Valve Gear. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 46
Horizontal Non-Condensing Engine. By the Berliner Union Actien Gesellschaft, Berlin, 498
Horizontal Non-condensing Engine. By Pickering and Davis, Portland, Conn., U.S.A., at the Vienna Exhibition, 455
Howard's Ploughs at the Vienna Exhibition, 473
Howitzer, 28-Centimetre, for Coast Defence. By F. Krupp, Essen, at the Vienna Exhibition, 252, 253
Hummell's Quadruple Printing Press, at the Vienna Exhibition, 411

Ice-making Machine. By Vass and Littmann, Halle-on-the-Saale, Germany, at the Vienna Exhibition, 346, 347
Implements for Tillage, at the Vienna Exhibition, 458, 459, 473
Indicator Diagrams, 283, 284
Instrument for Registering the Rise and Fall of the Tides. By Mr. F. H. Reitz, Hamburg, at the Vienna Exhibition, 82, 84
Iquique Railway, Peru, Double-bogie Locomotive (Fairlie's Patent), for the. By the Avonside Engine Company, Bristol, 395, 396
Iron Dwelling Houses. By S. C. Hemming and Co., at the Vienna Exhibition, 410
Iron Girder Bridge over the River Ouse at Lynn, Brunlees and McKerrow, Engineers, 463
Iron Water Tower, Details of. By the Erste Brünner Maschinen-fabrik, Gesellschaft, at the Vienna Exhibition, 142

Johnston Rake, The, at the Vienna Exhibition, 88
Jointing Pipes, 91

Kaiser Ferdinand's Nordbahn, Carriage Details used on the, 200, 201
Kaiser Ferdinand's Nordbahn, Carriage Heating Apparatus used on the, 159
Kaiser Ferdinand's Nordbahn, First-Class Carriage for the, 188
Kaiser Ferdinand's Nordbahn, Goods Locomotives for the, 518
Kaiser Ferdinand's Nordbahn, Sleeping Carriage for the, 158
Kaiser Ferdinand's Nordbahn, Shunting Engine for the, at the Vienna Exhibition, 519
Kao River, Aqueduct under the (Sone Canals), 313
Kayser's Needle-stamping Machine. By G. Prinz, at the Vienna Exhibition, 237
Kessler's Locomotive for the Carl Ludwigs-Bahn, at the Vienna Exhibition, 113
Kessler's Tender for the Carl Ludwigs-Bahn, 119
Kiessler's Calendering Machine for Woollen Fabrics, at the Vienna Exhibition, 447
Kiessler's Calico-Drying Machine, at the Vienna Exhibition, 417
Kiessler's Craping Machine for Textile Fabrics, at the Vienna Exhibition, 451
Kirkstall Forge Company's Three Hundredweight Steam Hammer, at the Vienna Exhibition, 119
Klett and Company's Sleeping Carriage for the Kaiser Ferdinand's Nordbahn, at the Vienna Exhibition, 158
Knitting Loom, Mechanical. By E. Saupe, Limbach, at the Vienna Exhibition, 359
Krauss's Four-wheeled Tank Locomotive, at the Vienna Exhibition, 122, 123
Krauss's Tank Locomotive, at the Vienna Exhibition, 304
Krupp's 8-Centimetre (3.15 in.) Field Gun, with Iron Carriage, at the Vienna Exhibition, 506
Krupp's 15-Centimetre (5.9 in.) Siege Gun, at the Vienna Exhibition, 503
Krupp's Long 15-Centimetre (5.9 in.) Gun, with Broadside Carriage, at the Vienna Exhibition, 507
Krupp's Long 24 Centimetre (9.448 in.) Naval Gun and Carriage, at the Vienna Exhibition, 153
Krupp's 12-Centimetre Gun with Naval Carriage at the Vienna Exhibition, 510
Krupp's 12-inch Coast Gun, at the Vienna Exhibition, 188
Krupp's 28-Centimetre Howitzer for Coast Defence, at the Vienna Exhibition, 252, 253
Krupp's 21-Centimetre (8.268 in.), Long Gun. By F. Krupp, Essen, at the Vienna Exhibition, 378
Krupp's 21-Centimetre (8.268 in.) Siege Gun, at the Vienna Exhibition, 376, 377
Krupp's 26-Centimetre Naval Gun, at the Vienna Exhibition, 331

Lacis and Co.'s Press for Ridge or Gutter Tiles at the Vienna Exhibition, 115
Langhof's Brake, as used on the Kaiser Ferdinand's Nordbahn, 201
Langhof's Carriage Window, as used on the Kaiser Ferdinand's Nordbahn, 201
Lathe, An Ancient, 226
Lartigue and Forest's Automatic Whistle. By MM. Digney Frères, Paris, at the Vienna Exhibition, 423
Launch, High-speed Steam, "The Firefly." By J. I. Thornycroft and Company, Chiswick, 236
Leeds Bridge, Plan of the New, 9, 64
Leith Dock Extension, Map of, 213
Lighthouse at Race Rock; Eastern Entrance to Long Island Sound, America, 296
Lighthouse at "The Thimble Shoal," Hampton Roads, Virginia, America, 296
Links, Expansion, 103
Lithographic Press. By P. Swiderski, Leipzig, at the Vienna Exhibition, 55
Lithographic Printing Press. By G. Sigl, Berlin, at the Vienna Exhibition, 316
Loads, Rolling, The Bracing of Bowstring Girders under, 263
Locks, Head, of the Sone Canals, 312
Locomotive for the Bergisch-Märkische Railway. By the Stettiner-Maschinenbau-Gesellschaft "Vulcan," near Stettin, at the Vienna Exhibition, 37, 38, 39
Locomotive Boiler, Goods, for the Bergisch-Märkische Railway. By Henschel and Son, Cassel, at the Vienna Exhibition, 74, 76
Locomotive for the Carl Ludwigs-Bahn. By E. Kessler, Esslingen, at the Vienna Exhibition, 113
Locomotive, Double-bogie (Fairlie's Patent), for the Iquique Railway, Peru. By the Avonside Engine Co., Bristol, 395, 396
Locomotive, Double-bogie (Meyer's System), By the Compagnie Belge, Brussels, at the Vienna Exhibition, 35
Locomotive Engine Wheels, 15
Locomotive, Express. By the Société Alsacienne de Constructions Mécaniques, Mulhouse, at the Vienna Exhibition, 384, 385
Locomotive, Express, for the Grand Central Railway of Belgium. By the Société Anonyme de Marcinelle et Couillet, at the Vienna Exhibition, 246
Locomotive, Express, for the Southern Railway of Austria. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 5
Locomotive, Four-Wheeled Tank By Krauss and Co., Munich, at the Vienna Exhibition, 122, 123
Locomotive, Goods, for the Bavarian State Railways. By T. A. Maffei, Munich, at the Vienna Exhibition, 247, 250
Locomotive, Goods, for the Kaiser Ferdinand's Nordbahn. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 518
Locomotive, Goods, for the Paris and Orleans Railway. By Ciaparède and Co., St. Denis, at the Vienna Exhibition, 442, 443
Locomotive, Goods, for the Kaiserin Elisabeth Railway of Austria. By the Sächsische Maschinen-fabrik zu Chemnitz, Chemnitz, at the Vienna Exhibition, 136
Locomotive, Goods, for the Southern Railway of Austria. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 224
Locomotive, Goods, for the Southern Railway of France. By Schneider and Co., Creusot, at the Vienna Exhibition, 334, 335
Locomotive, Passenger, for the North-Western Railway of Austria. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 328
Locomotive, Passenger, Tender for. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, Belgium, at the Vienna Exhibition, 265
Locomotive, Tank. By the Berliner Maschinenbau Actien Gesellschaft, Berlin, at the Vienna Exhibition, 228
Locomotive, Tank. By Krauss and Co., Munich, at the Vienna Exhibition, 304
Locomotive, Tank (18 in. gauge), for Tramways at the Royal Dockyards, Chatham, By Manning, Wardle, and Co., Leeds, 492
Locomotive, Tank, for the 3 ft. 1½ in. Gauge. By the Darmstadt Engine Works, Darmstadt, at the Vienna Exhibition, 434

Locomotive Tubes, Machine for Cutting. By the Chemnitzer Werkzeug-maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 285

Locomotives, Goods, for the Kaiser Ferdinand's Nordbahn. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 518

Log Frame, Vertical. By F. Wanniesk, Brunn, 438, 439

Long 15-Centimetre (5.9 in.) with Broadside Carriage. By. F. Krupp, Essen, at the Vienna Exhibition, 507

Long 30½-Centimetre (12½ in.) Breechloading Gun Carriage for Coast Defence. By F. Krupp, Essen, at the Vienna Exhibition, 188

Long 24-Centimetre (9.448 in.) Naval Gun and Carriage. By F. Krupp, Essen, at the Vienna Exhibition, 133

Long 21-Centimetre Gun (8.268 in). By F. Krupp, Essen, at the Vienna Exhibition, 378

Lowry's Radial Drilling Machine for the Société John Cockerill, Sersing, 338

Lubricants, Apparatus for Testing, 92

Lynn, Bridge over the River Ouse at, Brunlees and M'Kerrow, Engineers, 463

Machine, Calico-Drying. By A. Kiessler, Zittau, 417

Machine, Circular Planing. By Gans and Co., Buda, Hungary, at the Vienna Exhibition, 301

Machine, Cord-making. By G. Stein, Berlin, at the Vienna Exhibition, 359

Machine for Craping Textile Fabrics. By Kiessler, Zittau, at the Vienna Exhibition, 415

Machine, Double-boring and Facing. By Bede and Co., Verviers, Belgium, at the Vienna Exhibition, 141, 144

Machine, Double Drilling. By Pfaff, Fernau, and Co., Vienna, at the Vienna Exhibition, 4

Machine for Drilling Rails. By Wagner and Company, Dortmund, Westphalia, at the Vienna Exhibition, 137

Machine, Duplex Shaping. By the Werkzeug-maschinen-fabrik Saxonia, Chemnitz, at the Vienna Exhibition, 262

Machine, An Early Sewing, 321

Machine, Electrotyping, at the Vienna Exhibition, 425

Machine for Folding Textile Fabrics. By the Charlottenburg Action Gesellschaft, für Stuckfarberei und Maschinenbau, at the Vienna Exhibition, 451

Machine, Gebauer's Distributing. By the Actien-Gesellschaft für Stuckfarberei, Appretur und Maschinenfabrication, Charlottenburg, near Berlin, at the Vienna Exhibition, 416

Machine for Ice-making. By Vaas and Littmann, Halle-on-the-Saale, Germany, at the Vienna Exhibition, 346, 347

Machine, Patent Brick-making, Morand's. By T. S. Derham, Leeds, at the Vienna Exhibition, 413

Machine, Planing. By Schöne and Son, Leipzig, at the Vienna Exhibition, 43

Machine, Planing. By Sharp, Stewart, and Company, Manchester, at the Vienna Exhibition, 251

Machine, Planing, Tonguing, and Grooving, for Parquetry. By Gans and Company, Ofen, at the Vienna Exhibition, 393, 394

Machine, Plate-edge Planing. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 259

Machine, Portable Tyre-drilling. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 358

Machine for Printing and Folding, The "Victory." By the "Victory" Company, Liverpool, at the Vienna Exhibition, 100, 101

Machine, Punching and Shearing. By Englerth and Cänzer, Eschweiler-Aue, at the Vienna Exhibition, 153

Machine, Rail-Sawing. By Wagner and Company, Dortmund, Westphalia, at the Vienna Exhibition, 293

Machine, Rail-Straightening. By Wagner and Company, Dortmund, at the Vienna Exhibition, 197

Machine, Heavy Shearing. By the Friedrich-Wilhelms-hütte Iron and Mining Company, Mulheim-on-the-Ruhr, Rhenish Prussia, 77, 80, 81

Machine for Shaping Heavy Work. By Sharp, Stewart, and Company, Manchester, 268

Machine, Singeing. By the Zittauer Maschinen-fabrik und Eisengiesserei, Zittau, at the Vienna Exhibition, 373

Machine, Slot-drilling. By the Werkzeugmaschinen-fabrik Saxonia, Chemnitz, at the Vienna Exhibition, 347

Machine for Stamping Needles, Kayser's. By G. Printz, at the Vienna Exhibition, 237

Machine for Stretching Textile Fabrics. By J. Ducommun and Company, Mulhouse, at the Vienna Exhibition, 450

Machine for Stretching Textile Fabrics. By W. R. Birch, Manchester, at the Vienna Exhibition, 450

Machine for Testing Lubricants, 92

Machine, Tile-making. By M. J. Schmerber, Mulhouse, at the Vienna Exhibition, 530

Machine, Tube-cutting. By the Chemnitz Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 285

Machine, Twisting and Covering. By G. Stein, Berlin, at the Vienna Exhibition, 359

Machine for Wall-drilling. By the Berliner Eisengiesserei und Werkzeugmaschinen-fabrik, Berlin, at the Vienna Exhibition, 93

Machine for Warp-dressing. By the Erste Brünner Maschinen-fabriks Gesellschaft, Brünn, at the Vienna Exhibition, 239

Machine, Wheel-cutting and Dividing. By the Chemnitz Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 288

Machine, Wood-Planing. By Richards, London, and Kelley, Philadelphia, 522

Machine for Wool-opening. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 272

Machine, Yarn-drying. By the Sächsische Maschinen-fabrik, (formerly R. Hartmann and Co.), Chemnitz, at the Vienna Exhibition, 470

Machinery for the Manufacture of Soda Water. By Dows, Clark, and Company, at the Vienna Exhibition, 190

Machinery, Pail-Making. By Mr. Whitney, Winchendon, Massachusetts, U.S., 526

Machinery for Preparing Silk Waste. By T. and F. Bell, Krieau, at the Vienna Exhibition, 225

Machines, Special, for Pattern Making. By Richards, London, and Kelley, Philadelphia, 432

Maffei's Goods Locomotive for the Bavarian State Railways at the Vienna Exhibition, 247, 250

Magneto-Electric Machine, Siemens', at the Vienna Exhibition, 177, 490

Map of Dover Bay, Showing Proposed Harbour Schemes, 136

Map of Leith Dock Extension, 212

Manning and Wardle's Tank Locomotive (18 in. Gauge) for Tramways at the Royal Dockyards, Chatham, 402

Manufacture of Wood Pulp by Sinclair's Process, Plant for, at the Vienna Exhibition, 476, 477

Mariazell Iron Works, Styria, Blast Furnace at the, 174

Marine Boiler, 90 Horse Power, Amateur Designing, 51

Marine Engine, Compound, 140 Horse Power, Nominal. By the Stabilimento Tecnico Triestino, Trieste, at the Vienna Exhibition, 462

Marsden's Combined Stone Breaker and Engine, 429

Martin's Apparatus for Cleaning Cards, at the Vienna Exhibition, 289

Martin's Carding Machines for Wool, at the Vienna Exhibition, 288

Martin's Self-Acting Oiling Machine for Wool, at the Vienna Exhibition, 275

Martin's Wool-opening Machine, at the Vienna Exhibition, 272

Martin's Wool-Spinning Machine at the Vienna Exhibition, 289

Mechanical Knitting Loom. By E. Saupe, Limbach, at the Vienna Exhibition, 33

Merryweather's Steam Fire Engine, at the Vienna Exhibition, 87

Meyer's System, Double-Bogie Locomotive on the. By the Compagnie Belge, Brussels, at the Vienna Exhibition, 36

Meyn's Patent High Pressure Boiler, at the Vienna Exhibition, 204

Model of a 1200 Horse Power Turbine for a Cotton Mill, near St. Petersburg. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 8, 9

Morand's Brick-making Machine. By T. S. Derham, Leeds, at the Vienna Exhibition, 413

Morrell's Patent High Pressure Engine and Boiler, at the Vienna Exhibition, 153

Motion, Parallel, at the Vienna Exhibition, 284

Motor, New Caloric. By F. Siemens, Dresden, at the Vienna Exhibition, 350

Moulds, Ancient, for Bronze Knives, at the Vienna Exhibition, 179

Murillo, The S.S., 484

Nagel and Kaemp's Partial Turbine, at the Vienna Exhibition, 390, 391

Naval Gun and Carriage, Long 24-Centimetre (9.448 in.). By F. Krupp, Essen, at the Vienna Exhibition, 133

Naval Gun, 26-Centimetre. By F. Krupp, Essen, at the Vienna Exhibition, 351

Needle-stamping Machine, Kayser's. By G. Printz, at the Vienna Exhibition, 237

New Caloric Motor. By F. Siemens, Dresden, at the Vienna Exhibition, 350

New Harbour Works at Dover, Plan Prepared by Colonel Sir A. Clarke, 166

Non-Condensing Horizontal Engine. By the Berliner Union Actien Gesellschaft, Berlin, 496, 500

Non-condensing Horizontal Engine. By Pickering and Davis, Engineers, Portland, Conn., U.S.A., at the Vienna Exhibition, 455

North-Western Railway of Austria, Turntable for the. By the Grazer Waggon Maschinen und Stahlwerks-Gesellschaft, Graz, at the Vienna Exhibition, 216

Oiling Machine, Self-acting, for Wool. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 275

On the Torsional Resistance of Materials, 205

Opening Wool, Machine for. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 272

Overhead Travelling Cranes. By L. Steckenholz, Wetter-on-the-Ruhr, Westphalia, at the Vienna Exhibition, 118

Overhead Travelling Cranes, at the Middlesbrough Docks. By Appleby Brothers, London, 435

Overheated Boiler Flues, 24

Pail-Making Machinery. By Mr. Whitney, Winchendon, Massachusetts, U.S., 526

Pan, Hallström's Vacuum, for Crystallising Sugar, at the Vienna Exhibition, 140

Parallel Motion, at the Vienna Exhibition, 284

Parquetry Machine. By Gans and Company, Ofen, at the Vienna Exhibition, 393, 439

Partial Turbine. By Nagel and Kaemp, Hamburg, at the Vienna Exhibition, 390, 391

Passenger Locomotive for the North-Western Railway of Austria. By Herr G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 226

Passenger Locomotive, Tender for. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, Belgium, at the Vienna Exhibition, 205

Patent Brick-making Machine. By T. S. Derham, Leeds, at the Vienna Exhibition, 413

Patent High-Pressure Boiler, Bergmann's, at the Vienna Exhibition, 42, 43, 44

Patent High Pressure Boiler, Meyn's. By the Actien Gesellschaft der Hollerschen, Carlshütte, Rendsburg, at the Vienna Exhibition, 204

Pattern-making Machines, Special. By Richards, London, and Kelley, Philadelphia, 432

Perrotine, Eight-colour Printing Machine. By C. Bialon (Late C. Hummel) Berlin, at the Vienna Exhibition, 471

Pfaff and Fernau's Double Drilling Machine, at the Vienna Exhibition, 4

Pickering's Horizontal Non-condensing Engine, at the Vienna Exhibition, 455

Pipe-casting, Moulds for. By J. Stummer-Traunfels, Marienzell, 255

Pipe Jointing, 91

Plan of the Leeds New Bridge, 9, 64

Plan and Section of Holyhead Breakwater, 253, 254

Planing Machine, Circular. By Gans and Company, Buda, Hungary, at the Vienna Exhibition, 301

Planing Machine. By Schöne and Son, Leipzig, at the Vienna Exhibition, 43

Planing Machine. By Sharp, Stewart, and Company, Manchester, at the Vienna Exhibition, 251

Planing Machine, Plate-edge. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 259

Planing Machine, Wood. By Richards, London, and Kelley, Philadelphia, 522

Plans of Authorised and Proposed Schemes for Dover Harbour, 134

Plant for the Manufacture of Wood Pulp. By Sinclair's Process, at the Vienna Exhibition, 476 477

Plate Edge Planing Machine. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 259

Plough, Clayton and Shuttleworth's, at the Vienna Exhibition, 328

Ploughing Engine, Steam. By J. Fowler and Company, Leeds, at the Smithfield Club Show, 480, 481

Ploughs, American, at the Vienna Exhibition, 494

Ploughs, Bohemian, at the Vienna Exhibition, 527

Ploughs, German, at the Vienna Exhibition, 494, 495

Ploughs, Howard's, at the Vienna Exhibition, 473

Ploughs, Ransomes', at the Vienna Exhibition, 458, 459

Pneumatic Tubes, Crespin and Lapergne's Apparatus for, 208

Portable Battery, Stanley's, 16

Portable Crank-pin Turning Machine. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 420

Portable Engine, Straw-burning. By Ruston, Proctor, and Company, Lincoln, at the Smithfield Club Show, 483

Portable Engine, Steam Jacketted Cylinders for, 34, 54, 109

Portable Tyre-drilling Machine. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 358

Press, Lithographic. By P. Swiderski, Leipzig, at the Vienna Exhibition, 55

Press for Ridge or Gutter Tiles. By E. Laeis and Company, Trier, Rhenish Prussia, at the Vienna Exhibition, 115

Press, Wollmann's Beetroot Rolling. By J. Aders, Neustadt-Magdeburg, at the Vienna Exhibition, 268, 269

Printing and Folding Machine, The "Victory." By the "Victory" Company, Liverpool, at the Vienna Exhibition, 100, 101

Printing Press, Continuous Web. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 22, 23

Printing Press, Lithographic. By G. Sigl, Berlin, at the Vienna Exhibition, 316

Printing Press, Quadruple. By Mr. Bialon, Berlin, at the Vienna Exhibition, 411

Proposed Bridge Ferry over the River Tees, at Middlesbrough, 60

Proposed Harbour Schemes for Dover Bay, Map of, 130

Proposed New Harbour Works at Dover; Plan Prepared by Colonel Sir A. Clarke, 166

Pumping Engine, Direct-Acting. By Decker Brothers, Canstatt, Würtemberg, at the Vienna Exhibition, 367, 370, 371

Pumping Engines. By the Erste Brünner Maschinen-fabrik, Gesellschaft, Brünn, at the Vienna Exhibition, 242

Pumps, and Three-Cylinder Engines. By Brotherhood and Hardingham, London, at the Vienna Exhibition, 264, 265

Punching and Shearing Machine. By Englerth and Cänzer, Eschweiler-Aue, at the Vienna Exhibition, 153

Quadruple Printing Press. By Mr. Bialon, Berlin, at the Vienna Exhibition, 411

Race Rock Lighthouse; Eastern Entrance to Long Island Sound, America, 296

Radial-Drilling Machine. By Lowry and Company, Salford, Manchester, 338

Rail-Drilling Machine. By Wagner and Company, Dortmund, Westphalia, at the Vienna Exhibition, 137

Rail-Sawing Machine. By Wagner and Company, Dortmund, Westphalia, at the Vienna Exhibition, 293

Rail-Straightening Machine. By Wagner and Company, Dortmund, Westphalia, at the Vienna Exhibition, 197

Railway Carriage Details at the Vienna Exhibition, 201

Rake, The Johnston, at the Vienna Exhibition, 88

Ransomes' Ploughs, at the Vienna Exhibition, 458, 459

Reaping and Mowing Machines, American, at the Vienna Exhibition, 68

Reinecke's Horizontal Engine, at the Vienna Exhibition, 108, 109

Reitz's Tide Register, at the Vienna Exhibition, 92, 94

Relay Apparatus for Pneumatic Tubes, Crespin and Lapergne's, 208

Richards's Special Machines for Pattern Making, 432

Ridge or Gutter Tiles, Press for. By E. Laeis and Company, Trier, Rhenish Prussia, at the Vienna Exhibition, 115

Ringhofer's Composite Carriage for the Kaiser Ferdinand's Nordbahn, Austria, at the Vienna Exhibition, 486

Ringhofer's First-Class Carriage for the Carl Ludwig's Railway of Austria, at the Vienna Exhibition, 511

River Aire, at Leeds, Plan of New Bridge over the, 9, 64

River, The East, Bridge over the, 217

River Ouse, Bridge over the, at Lynn, Brunlees and McKerrow, Engineers, 463

River Tees, at Middlesbrough, Proposed Bridge Ferry over the, 60

Rolling Loads, The Bracing of Bowstring Girders under, 289

Rolling Press, Wollmann's Beetroot. By J. Aders, Neustadt-Magdeburg, at the Vienna Exhibition, 268, 269

Rolling Stock for the Madeira and Mamoré Railway, 500, 502

Rotary Engine, Dudgeon's, New York, 298, 299

Royal Dockyard, Chatham, Tank Locomotive (18 in. Gauge) for Tramways at. By Manning, Wardle, and Company, Leeds, 402

Ruston's Straw-Burning Portable Engine, at the Smithfield Club Show, 483

Saloon Carriage for the Kaiserin Elisabeth Railway. By the Bubna Wagon Works, near Prague, at the Vienna Exhibition, 317

Sand Blast Apparatus, Tilghman's, 273

Saupe's Mechanical Knitting Loom, at the Vienna Exhibition, 339

Saw Frame for Cutting Logs. By F. Wanniesk, 438, 439

Schmerber's Tile-Making Machine, at the Vienna Exhibition, 530

Schneider's Goods Locomotive for the Southern Railway of France at the Vienna Exhibition, 234, 235

Schneider's Vertical Compound Engine, at the Vienna Exhibition, 514, 515

Schöne's Planing Machine, at the Vienna Exhibition, 43

Scrap-Shearing Machine. By the Friedrich-Wilhelms-Hütte Iron and Mining Company, Mulheim-on-the-Ruhr, Rhenish Prussia, 77, 80, 81

Section of Composite Carriage for the Kaiser Ferdinand's Nordbahn, Austria. By F. Ringhofer, Smichow, near Prague, 486

Section and Plan of Holyhead Breakwater, 253, 254

Section and Plan of Pumping Engines and Boilers. By the Erste Brünner Maschinenfabriks Gesellschaft, Brünn, at the Vienna Exhibition, 242

Self-Acting Oiling Machine for Wool. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 273

Self-Acting Shutters for Head Sluices on the Sone Canals, Fourneres', 219, 220, 221

Self-Moving Anchor, Greenslade's, 54

Sewage, Apparatus for the Utilisation of, 131

Sewing Machine, An Early, 321

Shaping Machine, Duplex. By the Werkzeug-maschinen-fabrik Saxonia, Chemnitz, at the Vienna Exhibition, 262

Shaping Machine. By Sharp, Stewart, and Company, Manchester, 268

Shand and Mason's Steam Fire Engines, at the Vienna Exhibition, 86, 256, 259

Sharp's Shaping Machine, 268

Sharp's Planing Machine, at the Vienna Exhibition, 251

Shearing Machine, Heavy. By the Friedrich-Wilhelms-Hütte Iron and Mining Company, Mulheim-on-the-Ruhr, Rhenish Prussia, 77, 80, 81

Shearing and Punching Machine. By Englerth and Cänzer, Eschweiler-Aue, at the Vienna Exhibition, 153

Shunting Engine for the Kaiser Ferdinand's Nordbahn, at the Vienna Exhibition, 519

Siege Gun, 15-Centimetre (5.9 in.). By F. Krupp, Essen, at the Vienna Exhibition, 507

Siege Gun, 21-Centimetre (8.268 in.). By F. Krupp, Essen, at the Vienna Exhibition, 378, 377

Siemens' Magneto-Electric Machine, at the Vienna Exhibition, 177, 490

Siemens' New Caloric Motor, at the Vienna Exhibition, 350

Sigl's Express Locomotive for the Southern Railway of Austria, at the Vienna Exhibition, 5

Sigl's Goods Locomotive for the Kaiser Ferdinand's Nordbahn. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 518

Sigl's Goods Locomotive for the Southern Railway of Austria, at the Vienna Exhibition, 234

Sigl's Lithographic Printing Press at the Vienna Exhibition, 316

Sigl's Passenger Locomotive for the North-Western Railway of Austria, at the Vienna Exhibition, 226

Sinclair's Process of Manufacturing Wood Pulp, Plant for, at the Vienna Exhibition, 476, 477

Singeing Machine. By the Zittauer Maschinen-fabrik und Eisengiesserei, Zittau, at the Vienna Exhibition, 373

Six-Coupled Tank Locomotive, 3 ft. 3½ in. Gauge. By the Compagnie de Fives-Lille, at the Vienna Exhibition, 444

Six-Horse Traction Engine and Crane, Aveling and Porter's, 104

Sketch of Dover Bay in the Time of Henry the Eighth, 135

Sleeping Carriage. By the Hernalser-Waggon-fabriks-Gesellschaft, Vienna, at the Vienna Exhibition, 466, 467

Sleeping Carriage for the Kaiser Ferdinand's Nordbahn, at the Vienna Exhibition, 158, 159

Slide Valves, Balanced, Dawes and Holt's, 514

Slot-Drilling Machine. By the Werkzeugmaschinen-fabrik Saxonia, at the Vienna Exhibition, 347

Sluices, Head, of the Sone Canals, Mr. Fourneres', 219, 220, 221

Smith's Proposed Ferry Bridge over the River Tees, at Middlesbrough, 60

Soda Water Machinery. By Dows, Clark, and Company, at the Vienna Exhibition, 190

Sone Canals, The, 219, 220, 221, 312, 513

Southern Railway of Austria, Express Locomotive for the. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition, 5

Special Machines for Pattern Making. By Richards, London, and Kelley, Philadelphia, 432

Spring Washer, Grover's, 43

Stalybridge Gas Works, Tar Pumps at the. By G. Gimson, Stalybridge, 329

Stamping Machine, Kayser's Needle. By G. Prinz, at the Vienna Exhibition, 237
Standard Axle-box for Carriages and Waguns; Kaiser Ferdinand's Nordbahn, 201
Stanley's Portable Battery, 16
Stationary Boilers. By Bolzano, Tedesco, and Company, Prague, at the Vienna Exhibition, 454
Stationary Engines, Continental, 378
Steam Expansion Curves, 382
Steam Fire Engine. By Merryweather and Sons, London, at the Vienna Exhibition, 57
Steam Fire Engines. By Shand and Mason, London, at the Vienna Exhibition, 96, 258, 259
Steam Hammer, Double-Acting. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 17
Steam Hammer, High-Speed. By G. Brinkmann and Company, Witten-on-the-Ruhr, Westphalia, at the Vienna Exhibition, 362
Steam Hammer, Three-Hundredweight. By the Kirkstall Forge Company, Leeds, at the Vienna Exhibition, 119
Steam-Jacketted Cylinders for Portable Engines, 34, 54, 103
Steam Launch, The "Firefly." By J. I. Thorneycroft and Co., Chiswick, 256
Steam-Ploughing Engine. By J. Fowler and Co., Leeds, at the Smithfield Club Show, 460, 461
Steam Striker. By D. Davies, Viaduct Works, Crumlin, Monmouth, at the Vienna Exhibition, 180, 181
Steam-Travelling Crane, Two-Ton. By J. H. Wilson and Company, Liverpool, at the Vienna Exhibition, 324
Stein's Cord-Making Machine, at the Vienna Exhibition, 359
Stein's Covering and Twisting Machine, at the Vienna Exhibition, 358
Stone Breaker and Engine, Combined. By H. R. Marsden, Leeds, 429
Straw-Burning Portable Engine. By Ruston, Proctor, and Company, Lincoln, at the Smithfield Club Show, 455
Stretching Machines for Textile Fabrics, at the Vienna Exhibition, 450
Striker, Steam. By D. Davies, Viaduct Works, Crumlin, Monmouth, at the Vienna Exhibition, 180, 181
Stuckenholz's Overhead Travelling Crane, at the Vienna Exhibition, 118
Stummer-Traunfel's Moulds for Pipes, 255
Sugar Crystallising Vacuum Pan, Hallström's, at the Vienna Exhibition, 140
Sulzer's Boiler and Feed Water Heater at the Vienna Exhibition, 280
Sulzer's Horizontal Condensing Engines, at the Vienna Exhibition, 281, 282
Sulzer Valve Gear, Horizontal Engine with. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 46
Swiderski's Lithographic Press, at the Vienna Exhibition, 55

Tank Locomotive. By the Berliner Maschinenbau Actien Gesellschaft, Berlin, at the Vienna Exhibition, 728
Tank Locomotive (18 in. Gauge) for Tramways, at the Royal Dockyards, Chatham. By Manning, Wardle, and Co., Leeds, 492
Tank Locomotive, Four-Wheeled. By Krauss and Co., Munich, at the Vienna Exhibition, 122, 123
Tank Locomotive, Six-Coupled. By Krauss and Company, Munich, at the Vienna Exhibition, 304
Tank Locomotive, Six-Coupled, 3 ft. 3½ in. Gauge. By the Compagnie de Fives-Lille, at the Vienna Exhibition, 444
Tank Locomotive for the 3 ft. 1¾ in. Gauge. By the Darmstadt Engine Works, Darmstadt, at the Vienna Exhibition, 434
Tar Pumps at the Stalybridge Gas Works. By G. Gimson, Stalybridge, 329
Tender for the Carl Ludwigs-Bahn. By Herr E. Kessler, Esslingen, 112
Tender for Passenger Locomotive. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, Belgium, at the Vienna Exhibition, 205
Testing Lubricants, Apparatus for, 92
"Thimble Shoal," Hampton Roads, Virginia, America, Lighthouse at the, 256
Third-Class Carriage, Two-Storied, for the Austrian State Railways. By the Hernalser-Waggon-fabrika-Actien-Gesellschaft, Vienna, at the Vienna Exhibition, 428, 429
Thorneycroft's Steam Launch, The "Firefly," 256
Thrashing Machines. By Ransomes, Sims, and Head, at the Vienna Exhibition, 499
Three-Cylinder Engines, and Helical Pumps. By Brotherhood and Hardingham, London, at the Vienna Exhibition, 264, 265
Three-Hundredweight Steam Hammer. By the Kirkstall Forge Company, Leeds, at the Vienna Exhibition, 119
Tide Register. By Mr. F. H. Reitz, Hamburg, at the Vienna Exhibition, 82, 84
Tile-Making Machine. By J. Schmerber, Mulhouse, at the Vienna Exhibition, 430
Tilghman's Sand Blast Apparatus, 273
Tillage Implements, at the Vienna Exhibition, 458, 459, 473
Tip Wagon at the East River Bridge Works, 217
Tonguing, Planing, and Grooving Machine for Parquestry. By Ganz and Company, Ofen, at the Vienna Exhibition, 393, 394
Torsional Resistance of Materials, On the, 205
Traction Engine and Crane, Six-horse, Aveling and Porter's, 104
Travelling Crane, Hand. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 284
Travelling Crane, Overhead. By L. Stuckenholz, Wetter-on-the-Ruhr, Westphalia, at the Vienna Exhibition, 118
Travelling Cranes, Overhead, at the Middlesbrough Docks. By Appleby Brothers, London, 435
Tube-cutting Machine. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 285
Turbine (1200 Horse Power) for a Cotton Mill, near St. Petersburg. By the Maschinen-fabrik, Augsburg, Bavaria, Model of, at the Vienna Exhibition, 8, 9
Turbines. By Nagel and Kaemp, Hamburg, at the Vienna Exhibition, 390, 391
Turning Machine, Crank-pin, Portable. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 420
Turntable for the North-Western Railway of Austria. By the Grazer Waggon Maschinenbau und Stahlwerks-Gesellschaft, Graz, at the Vienna Exhibition, 216
Twelve-Centimetre Gun, with Naval Carriage. By F. Krupp, Essen, at the Vienna Exhibition, 510
Twenty-Eight-Centimetre Howitzer, for Coast Defence. By F. Krupp, Essen, at the Vienna Exhibition, 232, 233
Twenty-One-Centimetre (8.268 in.), Long Gun. By F. Krupp, Essen, at the Vienna Exhibition, 375
Twenty-One-Centimetre (8.268 in.) Siege Gun. By F. Krupp, Essen, at the Vienna Exhibition, 376 377
Twisting and Covering Machine. By G. Stein, Berlin, at the Vienna Exhibition, 358
Two-Storied, Third-class Carriage for the Austrian State Railways. By the Hernalser-Waggon-fabrik-Actien-Gesellschaft, Vienna, at the Vienna Exhibition, 428, 429
Two-Ton Steam Travelling Crane. By J. H. Wilson and Company, Liverpool, at the Vienna Exhibition, 324
Tyre-Drilling Machine, Portable. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 358

Utilisation of Sewage, Apparatus for, 131

Vaas and Littman's Ice-making Machine, at the Vienna Exhibition, 346, 347
Vacuum Pan, Hallström's, for Crystallising Sugar, at the Vienna Exhibition, 140
Valve Gear for Corliss Engines, Wanniek and Koppner's Patent, at the Vienna Exhibition, 380
Valve Gear for Wood's Corliss Compound Engine. By J. and E. Wood, Bolton, 420, 421, 422
Valves, Balanced Slide, Dawes and Hoit's, 514
Vertical Compound Engine. By Schneider and Company, Creusót, at the Vienna Exhibition, 514, 515
Vertical Engine and Boiler. By Davey, Paxman, and Company, Colchester, at the Vienna Exhibition, 292, 293
Vertical Log Frame. By F. Wanniek, Brünn, 438, 439
"Victory" Printing and Folding Machine, The. By the "Victory" Company, Liverpool, at the Vienna Exhibition, 100, 101
Vidard's System, Two-Storied Third-Class Carriage for the Austrian State Railways on. By the Hernalser-Waggon-fabrika-Actien-Gesellschaft, Vienna, at the Vienna Exhibition, 428, 429
VIENNA EXHIBITION, THE:
Illustrations, 4, 5, 8, 9, 16, 17, 19, 22, 23, 26, 27, 35, 37, 39, 39, 42, 43, 44, 46, 56, 57, 61, 69, 72, 73, 74, 76, 77, 80, 81, 84, 88, 93, 96, 97, 99, 100, 101, 108, 109, 113, 116, 119, 119, 122, 123, 132, 136, 137, 140, 141, 144, 153, 155, 158, 159, 162, 163, 177, 178, 179, 180, 181, 188, 193, 197, 199, 200, 201, 204, 205, 206, 216, 224, 225, 226, 228, 233, 235, 236, 237, 243, 243, 246, 247, 248, 250, 255, 258, 259, 262, 264, 265, 268, 269, 272, 273, 280, 281, 282, 284, 285, 288, 289, 292, 293, 301, 304, 308, 309, 312, 313, 316, 317, 324, 325, 328, 331, 334, 335, 338, 339, 346, 347, 350, 351, 354, 355, 358, 359, 362, 366, 367, 370, 371, 373, 376, 377, 378, 380, 384, 385, 388, 390, 391, 393, 394, 395, 396, 398, 399, 406, 407, 410, 411, 413, 416, 417, 420, 421, 425, 428, 429, 434, 442, 443, 444, 447, 450, 451, 454, 458, 459, 462, 470, 471, 472, 476, 477, 486, 489
Agricultural Implements, 69, 83, 456, 459, 473, 494, 495, 527, 528
Art Castings, 73, 74
Hydraulic Motors, 390, 391
Iron Manufacture, 19, 97, 99, 179, 255, 309
Locomotives, 37, 38, 39, 74, 76, 136, 224, 225, 226, 247, 273, 248, 250, 334, 335, 384, 385, 442, 443, 444, 518, 519
Ordnance, 133, 186, 232, 233, 331, 376, 377, 378, 502, 506, 507
Paper Manufacture, 476, 477
Railway Rolling Stock, 158, 159, 199, 200, 201, 317, 406, 407, 428, 429, 488, 489, 511
Science Exhibits, 177, 178, 265, 266, 425, 490, 523
Soda-Water Machinery, 193
Stationary Engines, 3, 307
Textile Industry, 221, 239, 272, 273, 288, 289, 325, 339, 358, 359, 360, 373, 416, 417, 447, 450, 451, 470, 471
Wagner's Rail-Drilling Machine at the Vienna Exhibition, 197
Wagner's Rail-Sawing Machine at the Vienna Exhibition, 196
Wagner's Rail-Straightening Machine at the Vienna Exhibition, 197
Wagon, Covered Goods. By the Bubna Wagon Works, near Prague, at the Vienna Exhibition, 72
Wagon, Covered Goods, for the Ebensee-Ischl-Sieger Railway, Austria. By the Hernalser-Waggon-fabrika-Actien-Gesellschaft, Vienna, at the Vienna Exhibition, 489
Wagon, Tip, at the East River Bridge Works, 217
Wagons, Coal, Wheels for. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, Belgium, at the Vienna Exhibition, 206
Wall Drill. By the Berliner Eisengiesserei and Werkzeugmaschinen - fabrik, Berlin, at the Vienna Exhibition, 89
Wanniek and Koppner's Valve Gear for Corliss Engines at the Vienna Exhibition, 380
Water Tower, Details of. By the Erste Brünner Maschinen-fabrik Gesellschaft, at the Vienna Exhibition, 162
Wanniek's Vertical Log Frame, 438, 439
Warp-Dressing Machine. By the Erste Brünner Maschinen-fabrik Gesellschaft, Brünn, at the Vienna Exhibition, 229
Warping Frame. By the Erste Brünner Maschinen-fabrik Gesellschaft, Brünn, at the Vienna Exhibition, 233
Washer, Grover's Spring, 43
Web Printing Press, Continuous. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 22, 75
Wheel-Cutting and Dividing Machine. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 388
Wheels, Locomotive Engine, 15
Wheels for Coal Wagons. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, Belgium, at the Vienna Exhibition, 206
Whistle, Lartigue and Forest's Automatic. By MM. Digney Frères, Paris, at the Vienna Exhibition, 526
Wilson's Two-Ton Steam Travelling Crane at the Vienna Exhibition, 324
Wood-Planing Machine. By Richards, London, and Kelley, Philadelphia, 522
Wollman's Beetroot Rolling Press. By J. Aders, Neustadt-Magdeburg, at the Vienna Exhibition, 268, 269
Wood's Compound Engine with Corliss Valve Gear, 420, 421, 422
Wool-Opening Machine. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 272
Wool-Spinning Machine. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 289
Wool-Carding Machines. By C. Martin, Verviers, Belgium, at the Vienna Exhibition, 288
Woollen Fabrics, Machines for Calendering. By A. Kiessler, Zittau, at the Vienna Exhibition, 447
Working Gear of Express Locomotive for the Grand Central Railway of Belgium. By the Société Anonyme de Marcinelle et Couillet, Belgium, at the Vienna Exhibition, 346
Workmen's Houses. By S. C. Hemming and Company, at the Vienna Exhibition, 410
Wrought-Iron Buffer for Carriages, as used on the Kaiser Ferdinand's Nordbahn, 200

Yarn-Drying Machine. By the Sächsische Maschinen-fabrik (formerly R. Hartmann and Company) Chemnitz, at the Vienna Exhibition, 470

TWO-PAGE ENGRAVINGS.

Beetroot Evaporating Apparatus, Double Pan. By F. Hallström, Nienburg-on-the-Saale, at the Vienna Exhibition. To adjoin page 10
Blast Furnace, Büttgenbach's. To adjoin page 129
Bridge over the River Aire at Leeds. To adjoin page 9
Bridge over the River Aire at Leeds, Details of. To adjoin page 62
Bridge, The East River, Details of Hoisting Gear for the Brooklyn Caisson. To adjoin page 81
Bridge over the River Ouse at Lynn. (*Two Plates*). To adjoin page 463

Carriage, Ambulance, for the Lower Silesian Railway, at the Vienna Exhibition. To adjoin page 92
Carriage, Double-Bogie, for the Festiniog Railway (1 ft. 11½ in Gauge). To adjoin page 386
Carriage, First-Class, and Boiler Van, for the Carl Ludwig's Railway, Austria. By F. Ringhofer, Smichow. To adjoin page 511
Carriage, First-Class, with Sleeping Compartment. By the Grazer Waggon Maschinenbau und Stahlwerks Gesellschaft, at the Vienna Exhibition. To adjoin page 213
Carriage, Railway, with Weibel's Heating Apparatus, at the Vienna Exhibition. To adjoin page 206
Carriage, Saloon Hunting, for the Emperor of Austria, at the Vienna Exhibition. To adjoin page 318
Carriage, Third-Class, for the Southern Railway of Austria, at the Vienna Exhibition. To adjoin page 407

Engine, Compound Blowing. By the Société John Cockerill, at the Vienna Exhibition. To adjoin page 294
Engine, Compound Pumping, at the Eston Mines. By Joseph Clayton and Sons, Preston. To adjoin page 294
Engine, "The Dingler," by the Dingler'schen Maschinenfabrik, Zweibrücken, at the Vienna Exhibition. To adjoin page 163
Engine, Horizontal Compound. By the Gorlitzer Maschinenbau Anstalt, Gorlitz, at the Vienna Exhibition. To adjoin page 61
Engine, Horizontal Compound. By the Maschinenbau Actien Gesellschaft, Prague. To adjoin page 318
Engine, Horizontal Condensing. By Bode and Company, Verviers, at the Vienna Exhibition. To adjoin page 27
Engine, Horizontal Condensing. By Sulzer Brothers, Winterthur, at the Vienna Exhibition. To adjoin page 281
Engine, Horizontal Rolling Mill. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition. To adjoin page 124
Engine, Pumping. By the Erste Brünner Maschinen-fabriks, at the Vienna Exhibition. To adjoin page 241
Engines, Compound Marine, 140 Horse Power, Nominal. By the Stabilimento Tecnico Triestino, Trieste, at the Vienna Exhibition. To adjoin page 462
Engines, Compound Marine. By the Stabilimento Tecnico Triestino, Trieste, at the Vienna Exhibition. To adjoin page 372
Engines, Horizontal Compound, with Wood's Corliss Valve Gear. To adjoin page 421
Engines, Horizontal Condensing. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition. To adjoin page 349
Engines, Rolling Mill. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition. To adjoin page 206
Engines for Submerged Wire-Rope Towage. By Sulzer Brothers, Winterthur, at the Vienna Exhibition. To adjoin page 415

Hammer, 15-Ton Steam. By the Märkische Maschinenbau Anstalt, at the Vienna Exhibition. To adjoin page 102
Hammer, 40-cwt. Steam. By Schultz and Göbel, Vienna, at the Vienna Exhibition. To adjoin page 142

Locomotive, Double-Bogie (Fairlie's System), for the Iquique Railway, Peru. To adjoin page 205
Locomotive, Double Bogie (Meyer's System). By the Compagnie Belge, Brussels, at the Vienna Exhibition. (*Two Plates*). To adjoin page 35
Locomotive, Express, for the Railways of Upper Italy. By the Société Alsacienne de Constructions Mécaniques, Mulhouse, at the Vienna Exhibition. (*Two Plates*). To adjoin page 385
Locomotive, Express, for the Southern Railway of Austria. By G. Sigl, Wiener-Neustadt, at the Vienna Exhibition. (*Two Plates*). To adjoin page 274
Locomotive, Goods, for the Bergisch-Märkische Railway. By Henschel and Son, Cassel, at the Vienna Exhibition. To adjoin page 74
Locomotive Goods, for the Kaiserin Elisabeth Railway, of Austria. By the Sächsische Maschinen-fabrik Chemnitz. To adjoin page 136
Locomotive, Goods, for the Paris and Orleans Railway. By Claparède and Co., St. Denis, at the Vienna Exhibition. To adjoin page 443
Locomotive, Goods, for the Southern Railway of France. By Schneider and Co., Creusót, at the Vienna Exhibition. (*Two Plates.*) To adjoin page 336
Locomotive, Passenger, for the Carl-Ludwig's-Bahn. By Emil Kessler, Esslingen, at the Vienna Exhibition. To adjoin page 113
Locomotive, Passenger. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, at the Vienna Exhibition. To adjoin page 205

Locomotive, Tank. By the Berliner Maschinenbau Actien Gesellschaft, at the Vienna Exhibition. (*Two Plates.*) To adjoin page 225
Locomotive, Tank (18 in. gauge) for Tramways at the Royal Dockyard, Chatham. By Manning, Wardle, and Company, Leeds. To adjoin page 492

"Murillo," The Steamship. To adjoin page 484

Steamship, The Dicey, for Channel Service. To adjoin page 523

Tables of Dimensions of Stationary Engines at the Vienna Exhibition. (*Two Sheets.*) To adjoin page 307
Thrashing Maschines. By Ransomes, Sims, and Head, Ipswich, at the Vienna Exhibition. To adjoin page 499
Turbine (1200 Horse Power) for a Cotton Mill, near St. Petersburg. By the Maschinen-fabrik Augsburg. To adjoin page 8

Vacuum Pan. By C. Heckmann, Berlin, at the Vienna Exhibition. (*Two Plates*). To adjoin page 55

Wagon, Iron Coal. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, at the Vienna Exhibition. To adjoin page 124
Wagon, Iron Coal. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, at the Vienna Exhibition. To adjoin page 206
Wagons, Details of, for the Madeira and Mamoré Railway, Bolivia. To adjoin page 500
Water Tower at the Vienna Exhibition. By the Erste Brünner Maschinenfabriks Gesellschaft, Brünn. To adjoin page 162

GENERAL INDEX.

ACCIDENTS by Asphyxia in Gas Conduits, 337
Accidents, Railway, 229, 252, 468
Accidents, Railway, in 1872, 252
Accidents to Submarine Cables, 277
Acts of Parliament for Locomotives on Common Roads, 66
Address of the President of the Iron and Steel Institute, 138
Aerated Water Manufacture, 30
Aero-Steam Engines, 283
Agricultural Implements at the Smithfield Club Show, 491
Agricultural Implements at the Vienna Exhibition, 65, 88, 181, 378, 408, 457, 473, 494, 527
I., II., American Reapers and Mowers, 68, 88
III., IV., V., Thrashing Machines, 181, 378, 408
VI., VII., VIII., IX., Tillage Implements, 457, 473, 494, 527
Agricultural Society's Show at Hull, The Royal, 30, 49
Air, Combustion in Compressed, 56
Alderney, Braye Bay Harbour, 441
Amateur Designing, A 90 Horse Power Marine Boiler, 50
American Arsenal, The Bridesburg, 344
American Cold Rolled Shafting, at the Vienna Exhibition, 75
American Lighthouses, 294
American Navy, The, 364
American Railways, The Cost of, 446
American Reapers and Mowers, at the Vienna Exhibition, 68, 88
AMERICAN SOCIETY OF CIVIL ENGINEERS, THE:
On Leakages in Water Pipes, by Joseph Whitney, 36
On the Adaptation of Mechanical Power to the Work of Charging and Discharging Gas Retorts, by Thomas F. Rowland, 36
American Universal International Exhibition in 1876 at Philadelphia, 202
Analysis of Report on Wrecks in 1872, 436
Anchor, Greenslade's Self-moving, 54
Aneroid, A New, 283
Annual Meeting of the Institution of Mechanical Engineers, 83, 107
Annual Provincial Meeting of the Iron and Steel Institute at Liége, 147, 169
Apparatus for Boat-Lowering, Gumpel's, 300
Apparatus for Boiler-Feeding. By MM. Rouffosse, Houget, and Teston, at the Vienna Exhibition, 141
Apparatus for Cutting Elliptical Grooves. By the Sächsische Maschinen-fabrik, at the Vienna Exhibition, 308
Apparatus for Gas Analysis, 329
Apparatus for Registering the Rise and Fall of the Tides, Reitz's, at the Vienna Exhibition, 92
Apparatus for Testing Lubricants, 92
Appleby's Overhead Steam Cranes at the Middlesbrough Docks, 437
Application of Portable Engines for Mining Purposes, 114
Apprentices, Engineering, Principles of Shop Manipulation for, 430, 448, 474, 513
Architects and Engineers, The Austrian Society of, 24
Armament of H.M.S. Shah, 167
Arrangements, General Sanitary, and Drainage of the Vienna Exhibition, 439
Art of Bridge Building, The Progress in, 297, 341
Art Castings at the Vienna Exhibition, 73, 231, 232, 413
Art of Turning, The, 70
Artificial Ice, Machinery for Making, Vaas and Littman's, at the Vienna Exhibition, 347
Artisans, English, at Vienna, 50
Asiatic Cholera and the Present Sanitary Arrangements, 12, 48
ASSOCIATION, THE BRITISH:
On the History, Progress, and Description of the Bowling Iron Works, by J. Wilcock, 245
On Fuel, by C. W. Siemens, 260
On Tilghman's Patent Sand Blast for Cutting, Grinding, Engraving, and Ornamenting Glass, Stone, Wood, Iron, and other Hard Substances, by W. E. Newton, 271
Firth's Coal-Cutting Machine, by William Firth, 282
On the Result of the Use of Heated Air in Combination with Steam in the Ordinary Running of a Locomotive Engine, on the Principle invented by George Warsop, by R. Eaton, 283
On an Improved Form of Aneroid for Determining Heights, with a Means of Adjusting the Altitude Scale for Various Temperatures, by Rogers Field, 283
On Peat, by F. Hahn Danchell, 294
Atlantic Cables, The, 253
Augsburg Web Printing Press, The, at the Vienna Exhibition, 23
Australia, Tin Mining in, 168
Austrian Engineers and Architects, The Society of, 24
Austrian Locomotives, 47
Austrian Railway Turntable. By the Grazer Wagon Maschinenbau und Stahlwerks-Gesellschaft, at the Vienna Exhibition, 216
Aveling and Porter's Crane Engine, 102
Awards at the Vienna Exhibition, 726

Balanced Slide Valves, Dawes and Holt's, 514
Barlow, Mr. W. H., on the Use of Steel, 251
Barometer, Metallic, Principles and Construction of the, 496, 512
Battery, Beetroot Diffusion. By the Maschinenbau Actien Gesellschaft, at the Vienna Exhibition, 355
Battery, Stanley's Portable, 16
Bede's Horizontal Engine, at the Vienna Exhibition, 37
Bede's Double Boring Machine, at the Vienna Exhibition, 142
Beetroot Boilers, Hallström's, at the Vienna Exhibition, 10
Beetroot Diffusion Battery. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 355
Beetroot Juice, Underground Conveyance of, 496
Beetroot Rolling Press, Wellmann's, at the Vienna Exhibition, 308
Beetroot Sugar, Improved Preparation of, 409
Beetroot Sugar, The Production of, in Germany, 16
Belgian Iron Industry, The, 151, 176
Belgium, The Coke Supply of, 175
Belgium, The Mineral Resources of, 186, 207
Belgrand's Experiments on the Sands of Fontainebleau, 415
Bergmann's Patent High-pressure Boiler, at the Vienna Exhibition, 43
Bialon's Quadruple Printing Press, at the Vienna Exhibition, 411
Biographical Notice of the Late M. Chatelier, 426
Biography of the Late George Fritz, 168
Blast Furnace, Büttgenbach's System of, 122, 150
Blast, Tilghman's Sand, 271
Blowing Engine, Cockerill's Compound, at the Vienna Exhibition, 294
Board of Trade Circular Letter, The, and Mr. Laing on Railway Accidents, 466
Board of Trade and Royal National Lifeboat Institution on Wrecks in 1872, 436
Board of Trade Surveyor, A, on the Strength of Boiler Shells, 270
Boat-lowering Apparatus, Gumpel's, 300
Bogs, Digging Canals in, 234
Boiler, Bergmann's Patent High-pressure, at the Vienna Exhibition, 43
Boiler and Engine, Morell's High-pressure, at the Vienna Exhibition, 157
Boiler and Engine, Vertical, Davey, Paxman, and Company's, at the Vienna Exhibition, 293
Boiler Explosion at Bradford, Mr. Waugh's Report on the, 149
Boiler Explosions, Circular from Commission in America, 315
Boiler-Feeding Apparatus. By MM. Rouffosse, Houget, and Teston, at the Vienna Exhibition, 141
Boiler and Feed-water Heater. By Sulzer Brothers, at the Vienna Exhibition, 281
Boiler Fires, Overheated, 34
Boiler. By the Grazer Wagon Maschinenbau und Stahlwerks Gesellschaft, at the Vienna Exhibition, 162
Boiler, Howard's, Explosion of a, 320
Boiler, Moyn's Patent, By the Actien Gesellschaft der Hollerschen Carlshütte, Rendsburg, at the Vienna Exhibition, 303
Boiler Shells, The Strength of, 270
Boilers, Beetroot, 10
Boilers of the Montana, The *Nautical Magazine* on the, 366
Boilers, Stationary, Bolzano, Tedesco, and Co.'s, at the Vienna Exhibition, 454
Boilers at the Vienna Exhibition, 20, 43, 157, 162, 205, 281, 295, 454
Boilers, Water-Tube, of the Steamship Montana, 191
Bolitho's Tin Smelting Works, Penzance, Visit of the Institution of Mechanical Engineers to the, 107
Botallack Mines, near the Land's End, Visit of the Institution of Mechanical Engineers to the, 107
Bowling Iron Works, The, 245
Bracing of Bowstring Girders under Rolling Loads, The, 263
Bracket Railway Chairs, 387
Braiding Machines at the Vienna Exhibition, 359
Braye Bay Harbour, Alderney, 441
Breakwater, The Holyhead, 253
Breechloading Gun (12½ in.) and Carriage for Coast Defence, F. Krupp's, at the Vienna Exhibition, 187
Brick-Making Machine, Morand's, at the Vienna Exhibition, 415
Brick and Tile-Making Machinery at the Vienna Exhibition, 220
Bridesburg Arsenal, U.S., 344
Bridge Building, Progress in, 297, 341
Bridge, The East River, Colonel W. A. Roebling's Report on the, 18, 81, 216, 238, 306, 330, 349
Bridge Ferry, Proposed, at Middlesbrough, 62
Bridge, The New Leeds, 9, 62
Bridge, New, at Wandsworth, Opening of the, 278
Bridge over the River Ouse at Lynn, Brunlees and McKerrow, Engineers, 444, 463
Brinkmann's High-Speed Steam Hammer, at the Vienna Exhibition, 361
Briquets de Saturne—Saturn Matches, 469
BRITISH ASSOCIATION, THE:
On the History, Progress, and Description of the Bowling Iron Works, by J. Wilcock, 245
On Fuel, by C. W. Siemens, 260
On Tilghman's Patent Sand Blast for Cutting, Grinding, Engraving, and Ornamenting Glass, Stone, Wood, Iron, and other Hard Substances, by W. E. Newton, 271
Firth's Coal-Cutting Machine, by William Firth, 282
On the Results of the Use of Heated Air in Combination with Steam in the Ordinary Running of a Locomotive Engine, on the Principle Invented by George Warsop, by R. Eaton, 283
On an Improved Form of Aneroid for Determining Heights, with a Means for Adjusting the Altitude Scale for Various Temperatures, by Rogers Field, 283
On Peat, by F. Hahn Danchell, 294
British Shipping, Report of the Royal Commission on, 275, 319, 491
Bronze, Phosphor, 218
Brotherhood and Hardingham's Engines and Pumps, at the Vienna Exhibition, 264
Brown's, Isaac, System of Irrigation in Sutherlandshire, 146
Burning Lead, 303
Büttgenbach's Blast Furnace, 122, 150

Cables, The Atlantic, 253
Cables, Ocean, The Repair of, 253
Cables, Submarine, Accidents to, 277
Caloric Motor, New, F. Siemens's, at the Vienna Exhibition, 350
Canals and Ports of France, 223
Canals, The Sone, 219, 312
Carl Ludwigs-Bahn, First-class Carriage and Boiler Van for the, 511
Carl Ludwigs-Bahn, Locomotive for the, at the Vienna Exhibition, 113
Carn Brae Mines, Visit of the Institution of Mechanical Engineers to the, 107
Carriage, Double Bogie, for the Festiniog Railway, 286
Carriage, Hospital, for the Lower Silesian Railway, at the Vienna Exhibition, 92
Carriages, Hospital, French and German, at the Vienna Exhibition, 49
Carriages, Railway, Wiebel, Briquet, and Co.'s System of Warming, at the Vienna Exhibition, 186
Case of the Royal Engineers, 500
Castings, Art, at the Vienna Exhibition, 73, 231, 232, 413
Cattle Wagon, Covered. By the Bubna Wagon Works, at the Vienna Exhibition, 72
Caution, A, in the Use of Derrick Cranes, 389
Caution, A; "Working Drawings," 50
Central Provinces of India, Water Works for the, 493
Centrifugal Pumping Machinery, Gwynne's, 67, 500
Change of Gauge on the Grand Trunk Railway of Canada, 357
Channel Tunnel, The, 478
Charpentier, M. Paul, on the Economy of Fuel, 413
Chatelier, The late M. Le, 426
Chemical Processes for Paper Manufacture at the Vienna Exhibition, 475
Chesterfield and Derbyshire Engineers' Institute, The, 33, 302
Chichester, The Manufacture of Water Gas at, 129
China Clay Works, The West of England, Drinnick Mill, Visit of the Institution of Mechanical Engineers to the, 108
Cholera and the Present Sanitary Arrangements, 12, 48
Circular Letter of the Board of Trade and Mr. Laing on Railway Accidents, 466
Circular Planing Machine, Ganz and Company's, at the Vienna Exhibition, 391
Civil Engineering at the Vienna Exhibition, 356
CIVIL ENGINEERS, THE AMERICAN SOCIETY OF:
On Leakages in Water Pipes, by Joseph Whitney, 36
On the Adaptation of Mechanical Power to the Work of Charging and Discharging Gas Retorts, by Thomas F. Rowland, 36
CIVIL ENGINEERS, THE INSTITUTION OF:
Premiums Awarded, Session 1872-73, 24
Subjects for Papers, Session 1873-74, 369
On the Design and Construction of Modern Locomotive Engines, by Mr. J. Robinson, 466
On the Construction and Maintenance of the Harbour at Braye Bay, Alderney, by Mr. Leveson Francis Vernon Harcourt, 441
On the Geological Conditions Affecting the Construction of a Tunnel between England and France, by Mr. Joseph Prestwich, 478
Clayton's Compound Pumping Engines at the Eston Mines, Middlesbrough-on-Tees, 294
Cleveland, Notes from, 10, 28, 45, 71, 83, 111, 124, 143, 163, 183, 207, 225, 246, 271, 293, 315, 340, 362, 387, 405, 427, 442, 463, 487, 505, 520
Closing of the Vienna Exhibition, 391
Club Show, The Smithfield, 479
Coal-Cutting Machine, Firth's, 282
Coal Question, The, 209, 230
Coal Question, The, in France, 311
Coal Raising, 153, 175
Coal Wagon, Iron. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, at the Vienna Exhibition, 124, 206
Cockerill's Compound Blowing Engine, at the Vienna Exhibition, 294
Cogswell's Cupola Furnace, 459
Coke Ovens, 171
Coke Supply of Belgium, The, 175
Cold Rolled Shafting, at the Vienna Exhibition, 75
Collisions at Sea, 434
Colonel Sir A. Clarke's Proposed New Harbour Works at Dover, 169
Combined Engines and Boilers, or Semi-Fixed Engines, at the Vienna Exhibition, 3
Combined Stone-Breaker and Engine, Marsden's, 430
Combustion in Compressed Air, 56
Combustion of Gases, The, 150
Commission, The Pilmsoll, 275, 319, 491
Commission on Scientific Education, Report of the, 496
Commissioners of Patents, Report of the, 145
Common Roads, Locomotive Engines on, 66
Communication, International, M. Dupuy de Lôme on, 127
Compound Engine, "The Dingler," at the Vienna Exhibition, 163
Compound Engine with Wood's Corliss Valve Gear, 421
Compound Horizontal Condensing Engine. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 319
Compound Horizontal Engine. By the Görlitzer Maschinenbau Anstalt, at the Vienna Exhibition, 61
Compound Marine Engines. By the Stabilimento Tecnico Triestino, at the Vienna Exhibition, 372, 461
Compound Marine Engines, 372
Compounds, Explosive, 369
Compressed Air, Combustion in, 56
Condensing Engine, Bede's Horizontal, at the Vienna Exhibition, 37
Condensing Engine, Horizontal, Sulzer Brothers', at the Vienna Exhibition, 281
Conductors, Lightning, 125
Congress, The International Patent, at Vienna, 106, 126, 169
Consumption of Iron in Germany, The, 16
Continuous Web Printing Press. By the Maschinen-fabrik Augsburg, at the Vienna Exhibition, 22
Conveyance of Beetroot Juice, Underground, 496
Corliss Engines, Waunlatch and Koppner's, Patent Valve Gear for, at the Vienna Exhibition, 286
Cornish Mines, 114
Cost of Railways in the United States, 446
Cotton Mill near St. Petersburg, Turbine (1200 horse power) for a. By the Maschinen-fabrik Augsburg, 8
Covered Goods Wagon. By the Bubna Wagon Works, at the Vienna Exhibition, 72
Crane Engine, Aveling and Porter's, 102
Crane, Hand Travelling. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 294
Crane, Two-Ton Steam Travelling, J. H. Wilson and Company's, at the Vienna Exhibition, 327
Cranes, Derrick, A Caution in the Use of, 389
Cranes and Hoisting Machinery at the Vienna Exhibition, 267, 314
Cranes, Overhead Travelling, L. Stuckenholz's, at the Vienna Exhibition, 117
Cranes, Overhead Travelling, at the Middlesbrough Docks, Messrs. Appleby Brothers', 437
Crank-Pin Turning Machine, Portable. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 420
Crank Pins, The Length of, 238
Crespin and Lapergne's Pneumatic Relay Apparatus, 146, 206
Crystallising Sugar, Vacuum Pan for, F. Hallström's, at the Vienna Exhibition, 141
Cultivating Machinery, Steam, at the Royal Agricultural Society's Show at Hull, 40
Cupola Furnaces, 459
Curves, Steam Expansion, 382
Cutting Edges of Engineers' Tools, Preserving the, 195
Cutting Elliptical Grooves, Apparatus for. By the Sächsische Maschinen-fabrik, at the Vienna Exhibition, 308
Cylinders, Steam Jacketted, 63

Danchell on Peat, 294
Dangers of Collision at Sea, 434
Danks Puddling Furnace, The, 151
Danek's Rolling Mill Engine. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 124, 206
Davey, Paxman, and Co.'s Feed-Water Heaters, 92, 510
Davey, Paxman, and Company's Vertical Boiler, at the Vienna Exhibition, 293
Davies' "Steam Striker," at the Vienna Exhibition, 187
Deacon, Mr. G., on the Water Supply of Liverpool, 483
Decker's Direct-Acting Pumping Engine, at the Vienna Exhibition, 371
Denver and Rio Grande Railway, Annual Report of the, 29
Deposits at the Private Bill Office for Intended Applications to Parliament, 465
Derbyshire and Chesterfield Engineers' Institute The, 33, 302
Derrick Cranes, A Caution in the Use of, 389
Designing, Amateur, A 90 horse power Marine Boiler, 50
Devon and Somerset Railway, Inspection of the, 327
Diagrams, Indicator, 383
Dicey Channel Steamer, The, 522
Difficulties, Sewage, 343
Diffusion Battery, Beetroot. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 355
Digging Canals in Bogs, 234
"Dingler" Engine, The. By the Dingler'schen Maschinen-fabrik Zweibrücken, at the Vienna Exhibition, 163
Diplomas of Honour Awarded at the Vienna Exhibition, 152, 183, 226, 278
Diplomas and Medals to Exhibitors at the Vienna Exhibition, 226
Direct-Acting Pumping Engine, Decker Brothers', at the Vienna Exhibition, 371
Distribution of Silver Medals to Meritorious Foremen and Workmen, at the Vienna Exhibition, 278
Dividing and Wheel-Cutting Machine. By the Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 366
Dock Extension, Leith, 211
Dolcoath Tin and Copper Mine, Visit of the Institution of Mechanical Engineers to, 107
Double-Acting Steam Hammer. By the Chemnitzer Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 17
Double-Bogie Composite Carriage for the Festiniog Railway, 286
Double-Bogie Locomotive (Meyer's System). By the Compagnie Belge, Brussels, at the Vienna Exhibition, 55
Double-Bogie System, The Advantages of, for Heavy Goods Locomotives, 445

Double-Boring Machine, Bede and Company's, at the Vienna Exhibition, 142
Double Drilling Machine, Pfaff, Fornva, and Company's, at the Vienna Exhibition, 4
Double-Shaping Machine. By the Werkzeugmaschinen-fabrik Saxonia, Chemnitz, at the Vienna Exhibition, 262
Dover Harbour, 169, 501
Dover Harbour, Captain J. C. Hoseason, R.N., on, 431
Drainage and Sanitary Fittings of the Vienna Exhibition, 429
"Drawings, Working;" A Caution, 50
Drill Wall. By the Berliner Eisengiesserei und Werkzeugmaschinen-fabrik, Berlin, at the Vienna Exhibition, 93
Drilling Machine, Radial. By Lowry and Company, Salford, for the Société John Cockerill, Seraing, 338
Drilling Machine, Rail, Wagner and Company's, at the Vienna Exhibition, 137
Drilling Machine, Slot. By the Werkzeugmaschinen-fabrik Saxonia, Chemnitz, at the Vienna Exhibition, 347
Dudgeon's Rotary Engine, 398
Dwelling Houses, Iron, at the Vienna Exhibition, 410
Dyeing and Printing Machinery, at the Vienna Exhibition, 470
Dynamite in France, 311

Early Sewing Machine, An, 321
East River Bridge, Colonel W. A. Roebling's Report on the, 18, 81, 216, 238, 306, 330, 349
Economy of Fuel, 412
Ehorali, C. W., Death of, 512
Edges of Wrought-Iron Plates, Machine for Planing. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 259
Education, Scientific, 471
Educational Exhibits at the Vienna Exhibition, 95
Effect of Stress on Metals, The, 478
Ehrhardt's "Dingler" Engine. By the Dingler'schen Maschinen-fabrik, Zweibrücken, at the Vienna Exhibition, 163
Eighteen-Seventy-Four, Railway Projects for, 455, 483
Eighteen-Seventy-Two, Railway Accidents in, 252
Elevators and Stackers at the Royal Agricultural Society's Show at Hull, 40
Elliptical Grooves, Apparatus for Cutting. By the Sächsische Maschinen-fabrik, Chemnitz, at the Vienna Exhibition, 308
Engine and Boiler, Morell's High-Pressure, at the Vienna Exhibition, 157
Engine and Boiler, Vertical, Davey, Paxman, and Company's, at the Vienna Exhibition, 293
Engine, Cockerill's Compound Blowing, at the Vienna Exhibition, 294
Engine, Compound Horizontal Condensing. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 318
Engine, Compound Horizontal. By the Gorlitzer Maschinenbau Anstalt, Gorlitz, at the Vienna Exhibition, 61
Engine, Compound, with Wood's Corliss Valve Gear, 421
Engine, Danek's Rolling Mill. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 124, 306
Engine, Direct-Acting Pumping, Decker Brothers', at the Vienna Exhibition, 371
Engine, Horizontal, Bede's, Details of, at the Vienna Exhibition, 27
Engine, Horizontal, of the Berliner Union Actien Gesellschaft, at the Vienna Exhibition, 499
Engine, Horizontal, Pickering and Davis's, 456
Engine, Horizontal, Reinecke's, at the Vienna Exhibition, 102
Engine, Horizontal, with Sulzer Valve Gear. By the Maschinen-fabrik, Augsberg, at the Vienna Exhibition, 44
Engine, Rotary, Dudgeon's, New York, 398
Engine, Sigl's Horizontal, 348
Engine, Stationary, Test of a, 490
Engine, Steam Fire, Merryweather and Sons', at the Vienna Exhibition, 59
Engine, Three-Cylinder, and Helical Pump, Brotherhood and Hardingham's, at the Vienna Exhibition, 264
Engine Trial at Vienna, 147
Engine, Vertical Compound, Schneider and Co.'s, at the Vienna Exhibition, 513
Engine Wheels, Locomotive, Haswell's Method of Constructing, 15
Engine Works, Harvey's, at Hayle, Visit of the Institution of Mechanical Engineers to the, 107
Engineer, The, Abroad, 89
Engineer, The, on Indicator Diagrams, 383
Engineering Apprentices, Principles of Shop Manipulation for, 430, 448, 474, 515
Engineering, Civil, at the Vienna Exhibition, 256
Engineers and Architects, The Austrian Society of, 74
Engineers, The Royal Naval, 501, 509
Engineers' Tools, Preserving the Cutting Edges of, 195
Engines, Aero-Steam, 283
Engines, Compound Marine. By the Stabilimento Tecnico, Tricatino, Trieste, at the Vienna Exhibition, 372, 461
Engines, Compound Pumping, at the Eston Mines, Middlesbrough-on-Tees, Clayton and Sons', 294
Engines, Compound Pumping, for Ferrara, 57, 500
Engines, Locomotive, on Common Roads, 66
Engines, Locomotive, at the Vienna Exhibition, 37, 74, 119, 130, 275, 287, 335, 385, 443, 516
Engines, Marine Compound, 372, 461
Engines, Miscellaneous, at the Vienna Exhibition, 156
Engines Portable, 11, 52
Engines, Pumping. By the Erste Brünner Maschinen-fabrik Gesellschaft, Brünn, at the Vienna Exhibition, 241
Engines, Rolling Mill, at the Vienna Exhibition, 59
Engines, Steam Fire, Shand and Mason's, at the Vienna Exhibition, 102, 251
Engines, Stationary, at the Vienna Exhibition, 2, 59, 156, 307
IV. Combined Engines and Boilers, or Semi-fixed Engines, 2
V. Winding Engines, 59
VI. Vertical Engines; Miscellaneous, 156
VII. Conclusion, 307
Engines for Submerged Wire-Rope Propulsion, Sulzer Brothers', 413
Engines, Traction, Experiments with, at the Vienna Exhibition, 53
Engines, Vertical, at the Vienna Exhibition, 156
Engines, Winding, at the Vienna Exhibition, 59
England and France, Improving the Communication between, 127
Englerth and Cünzer's Shearing Machine, at the Vienna Exhibition, 135
English Artizans at Vienna, 30
English and Foreign Pumps, at the Vienna Exhibition, 31
Erste Brünner Pumping Engines, at the Vienna Exhibition, 241
Erste Brünner Water Tower, The, at the Vienna Exhibition, 162
Estimated Cost of the Some Canals, General Abstract of the, 314
Eston Mines, Middlesbrough-on-Tees, Compound Pumping Engines at the. By Clayton and Sons, Preston, 294
Evaporating Apparatus for Beetroot Sugar, Hallström's, at the Vienna Exhibition, 10
Eugène Flachat, The Death of, 30
Exhibition of 1873, The International, 86, 128
Exhibition, The London International, 1874, Civil Engineering Classes at, 348
Exhibition, Universal International in 1876, at Philadelphia, U.S., 202
Exhibition, The Vienna, Diplomas of Honour awarded at, 152, 183, 226, 278
Exhibition, The Vienna, Distribution of Silver Medals to Meritorious Foremen and Workmen at the, 278
Exhibition, The Vienna, and *The Engineer*, 381
Exhibition, Vienna, Fire at the, 110
Exhibition, The Vienna, Prizes at the, 214
Exhibitors at the Vienna Exhibition, Awards to the, 152, 183, 226
Exhibits, Educational, at the Vienna Exhibition, 95
Exhibits at the International Exhibition of 1873, Additions to the, 86
Exhibits, Miscellaneous, at the Smithfield Club Show, 482
Exhibits, Science, at the Vienna Exhibition, 116, 177, 266, 333, 365, 425, 490, 524
Expansion Curves, Steam, 382
Expenditure and Revenue of Railways in India, 86
Experiments, by M. Belgrand, on the Sands of Fontainebleau, 415
Experiments by M. Cornut, on Flax Manufacture in France, 320
Experiments with Griffiths's New Screw Propeller, 403
Experiments on Phosphor-Bronze, at Berlin, 87
Experiments with Traction Engines, at the Vienna Exhibition, 53
Experiments with Whitbread's Sewage Process, Results of the, 33
Explosion of Boiler at Bradford, Mr. Waugh's Report on the, 149
Explosion of a Howard's Boiler, 320
Explosions, Boiler, Circular from Commission in America, 314
Explosive Compounds, 365
Express Locomotive, By G. Sigl, for the Southern Railway of Austria, at the Vienna Exhibition, 5
Express Locomotive, the "Rittinger." By Herr G. Sigl, at the Vienna Exhibition, 5, 274
Extension of Leith Docks, 211

Facing and Double-Boring Machine, Bede and Company's, at the Vienna Exhibition, 142
Factory Inspection, 523
Fairlie System, The, 395
Feeding Boilers. By MM. Roufosse, Hougst, and Teston, at the Vienna Exhibition, 141
Feed-Water Heater and Boiler, Sulzer Brothers', at the Vienna Exhibition, 281
Feed-Water Heaters, Davey, Paxman, and Co.'s, Colchester, 92, 510
Ferrara Pumping Engines, The, 57, 500
Ferry, Proposed Bridge, at Middlesbrough, 62
Festiniog Railway, Double-Bogie Composite Carriage for the, 286
Fever, Typhoid, and Sewage Grass, 145
Fifteen-Ton Steam Hammer. By the Märkische Maschinenbau, Anstalt, Wetter-on-the-Ruhr, at the Vienna Exhibition, 102
Fifty-Hundredweight Single-Acting Steam Hammer, Schultz and Göbel's, at the Vienna Exhibition, 142
Finishing Machines at the Vienna Exhibition, 373, 416, 450
Fire Engine, Steam, Merryweather and Sons', at the Vienna Exhibition, 59
Fire Engines, Steam, Shand and Mason's, at the Vienna Exhibition, 102, 256
Fire at the Vienna Exhibition, The, 110
"Firefly," Steam Launch, The, Thorneycroft and Co.'s, Chiswick, 286
Firth's Coal-Cutting Machine, 282
Fixed and Portable Engines at the Smithfield Club Show, 479
Flachat, Eugène, Death of, 30
Flax Manufacture in France, 320
Folding and Printing Machine, The "Victory." By the "Victory" Company, Liverpool, at the Vienna Exhibition, 103
Fontainebleau, The Sands of, 415
Foreign and Colonial Notes, 15, 26, 45, 71, 83, 110, 129, 143, 164, 187, 215, 234, 257, 315, 340, 400, 420, 449, 469, 500
Foreign and English Pumps, at the Vienna Exhibition, 31
Formulæ, Hydrodynamic, 13
Fortifications, Iron, 234
Four-Wheeled Tank Locomotive, Krauss and Company's, at the Vienna Exhibition, 119
France, The Coal Question in, 311
France, Dynamite in, 311
France, The Manufacture of Flax in, 320
French and German Hospital Trains, at the Vienna Exhibition, 49
French Iron Manufacture, 469
Fringe-Making Machines at the Vienna Exhibition, 359
Fritz, George, The Late, Biography of, 163
Fuel, Economy of, 412
Fuel, Mr. C. W. Siemens on, 269
Fuel, Mineral, at the Vienna Exhibition, 287, 353, 391, 413, 455
Furnace, Cogswell's Cupola, 429
Furnaces, Blast, Buttgenbach's System, 123, 150

Gans's Circular Planing Machine, at the Vienna Exhibition, 301
Gans's Planing, Tonguing, and Grooving Machine for Parquetry, at the Vienna Exhibition, 394
Gas Analysis, Apparatus for, 329
Gas Apparatus, A New, 426
Gas Conduits, Accidents in, by Asphyxia, 337
Gas Supply, The Metropolitan, 105, 502
Gas from Water, 126
Gases, The Combustion of, 153, 502
Gauge, Change of, on the Grand Trunk Railway of Canada, 257
General Palmer on the Denver and Rio Grande Railway, 29
General Scott's Sewage Cement Process, 299
German and French Hospital Trains, at the Vienna Exhibition, 49
Germany, Notes from, 18, 214, 234, 393
Gimson's Tar Pumps at the Stalybridge Gas Works, 229
Girard, M. Aimé, on the Progress of Modern Chemical Industries, 219
Girders, Bowstring, The Bracing of, under Rolling Loads, 263
Glasgow, Hallside Steel Works, at, 344
Gold Coast Railway Scheme, The, 423, 446
Goods Locomotive for the Kaiserin Elizabeth Railway of Austria, at the Vienna Exhibition, 135
Goods Locomotive for the Southern Railway of Austria, at the Vienna Exhibition, 224
Goods Locomotives, Heavy, 445
Goods Wagon, Covered. By the Bahna Wagon Works, at the Vienna Exhibition, 72
Government, Local, and Public Health, 363
Granier's Apparatus for Determining the Temperature of Ignition of Petroleum Oils, 337
Greenslade's Self-Moving Anchor, 54
Griffiths's System of Screw Propulsion, 403, 504
Grooving, Tonguing, and Planing Machine for Parquetry. By Ganz and Co., Ofen, at the Vienna Exhibition, 394
Grover's Spring Washer, 43
Gumpel's Boat-Lowering Apparatus, 200
Gun (12 in.) and Carriage, Breechloading, for Coast Defence. By F. Krupp, at the Vienna Exhibition, 187
Guns, New Field, 234
Guns at the Vienna Exhibition, 57, 115, 133, 233, 331, 377, 507
II., III., IV., Krupp's Guns, 57, 115, 133
V., VI., VII., VIII., Krupp's Gun Carriages, 233, 331, 377, 507
Gutter or Ridge Tiles, Press for, E. Laeis and Co.'s, at the Vienna Exhibition, 117
Gwynne & Walker and Co., 486
Gwynne's Centrifugal Pumping Machinery for Northern Italy, 67, 500

Hallside Steel Works, Glasgow, 344
Hallström's Beetroot Boilers, at the Vienna Exhibition, 10
Hallström's Vacuum Pan, at the Vienna Exhibition, 141
Hammer, Double-Acting Steam. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 17
Hammer, 15-ton Steam. By the Märkische Maschinenbau Anstalt, at the Vienna Exhibition, 102
Hammer, 50-cwt. Single-Acting Steam, Schultz and Göbel's, at the Vienna Exhibition, 142
Hammer, High-Speed Steam, G. Brinkmann and Co.'s, at the Vienna Exhibition, 361
Hammers, Steam, Kirkstall Forge Company's, at the Vienna Exhibition, 171
Hand-Travelling Crane. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 284
Harbour, Dover, 169, 501
Harbour Works at Jersey, The New, 343
Harvey's Engine Works, at Hayle, Visit of the Institution of Mechanical Engineers to the, 107
Hawksley, Wild, and Co.'s Method of Constructing Boiler Flues, 34
Hayward Tyler and Co.'s Apparatus for the Manufacture of Aerated Waters, 30
Head and Schemioth's Straw-Burning Engine, Trial of, at Vienna, 147
Health, Public, and Local Government, 363
Heaters, Feed-Water, Davey, Paxman, and Co.'s, 92, 510
Heavy Goods Locomotives, 445
Heavy Ordnance, 234
Heckmann's Vacuum Pan, at the Vienna Exhibition, 55
Helical Pump and Three-Cylinder Engine, Brotherhood and Hardingham's, at the Vienna Exhibition, 264
Hemmings and Co.'s Iron Houses, at the Vienna Exhibition, 410
High-Pressure Boiler, Bergmann's Patent, at the Vienna Exhibition, 43
High-Pressure Boiler, Meyn's Patent, at the Vienna Exhibition, 202
High-Pressure Engine and Boiler, Morell's, 157
High-Speed Steam Hammers, at the Vienna Exhibition, 361
H.M.S. Shah, Armament of, 167
Hoisting Machinery and Cranes, at the Vienna Exhibition, 267, 314
Holyhead Breakwater, The, 253
Horizontal Compound Condensing Engine, By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 318
Horizontal Compound Engine. By the Görlitzer Maschinenbau Anstalt, at the Vienna Exhibition, 61
Horizontal Condensing Engine, Sulzer Brothers', at the Vienna Exhibition, 281
Horizontal Engine of the Berliner Union Actien Gesellschaft, at the Vienna Exhibition, 499
Horizontal Engine, Pickering and Davis's, 456
Horizontal Engine, C. Reinecke's, at the Vienna Exhibition, 102
Horizontal Engine, Details of. By Messrs. Bede and Co., Belgium, at the Vienna Exhibition, 27
Horizontal Engine, Sigl's, 348
Horizontal Engine with Sulzer Valve Gear. By the Maschinen-fabrik Augsburg, at the Vienna Exhibition, 44
Hoseason, Captain J. C., R.N., on Dover Harbour, 431
Hospital Carriage for the Lower Silesian Railway, at the Vienna Exhibition, 92
Hospital Trains, at the Vienna Exhibition, 49
Houses, Iron Dwelling, at the Vienna Exhibition, 410
Howard's Boiler, Explosion of a, 320
Hull, The Royal Agricultural Society's Show at, 30, 40
Humber Tunnel, The, 65
Hummel's Quadruple Printing Press, at the Vienna Exhibition, 411
Hydraulic Motors, at the Vienna Exhibition, 223, 326, 389
Hydrodynamic Formulæ, 13

Ice-Making Machine, Vaas and Littmann's, at the Vienna Exhibition, 347
Implements, Agricultural, at the Smithfield Club Show, 481
Implements, Agricultural, at the Vienna Exhibition, 68, 88, 181, 378, 404, 457, 473, 494, 527
I., II. American Reapers and Mowers, 68, 88
III., IV., V. Thrashing Machines, 181, 378, 408
VI., VII., VIII., IX. Tillage Implements, 457, 473, 494, 527
Implements, Miscellaneous, at the Royal Agricultural Society's Show at Hull, 41
Improved Preparation of Beetroot Sugar, 409
Improvement in Railway Construction, 173, 196
India, Irrigation and Railway Works in, 189
Indian Railways, 86
Indicator Diagrams, 383
Industrial Progress, Modern, 219
Industry, Textile, at the Vienna Exhibition, 1, 69, 129, 194, 213, 221, 239, 273, 289, 325, 339, 359, 373, 416, 450, 470
I. Introduction; Raw Materials, 1
II. General Review of Textile Machinery; Woollen Industry, 69
III. Silk and Cotton-Spinning Machinery, 129
IV. Flax, Hemp, and Jute-Spinning Machinery, 194
V., VI., VII., XI. Weaving Machinery, 213, 221, 239, 339
VIII., IX. Wool-Spinning Machinery, 273, 289
X. The Preparation of Silk Waste, 325
XII. Fringe-Making Machinery, 359
XIII., XIV., XV. Finishing Machines, 373, 416, 450
XVI. Machines for Dyeing and Printing, 470
Information Wanted, 341
Inspection of the Devon and Somerset Railway, 227
Inspection, Factory, 523
Institute of Engineers, The Derbyshire and Chesterfield, 33, 302
Institution of Civil Engineers, The:
Premiums Awarded, Session 1872-73, 24
Subjects for Papers, Session 1873-74, 368
On the Design and Construction of Modern Locomotive Engines, by Mr. J. Robinson, 400
On the Construction and Maintenance of the Harbour at Braye Bay, Alderney, by Mr. Leveson Francis Vernon Harcourt, 441
On the Geological Conditions Affecting the Construction of a Tunnel between England and France, by Mr. Joseph Prestwich, 478
Institution of Mechanical Engineers, The:
Annual Meeting, 85, 107
On a Machine for Shaping Ships' Models, by Mr. W. Froude, 109
On Ore-Dressing Machinery, by Mr. Henry T Ferguson, 114
On Cornish Mines, by Mr. J. H. Collins, 114
On the Application of Portable Engines for Mining Purposes, by Mr. John Richardson, 114
On a Mechanical Scraper for Removing Incrustation from Water Pipes, by Mr. John Little, 114
On Bracket Chairs for Suspending Double Headed Rails on the West Cornwall Railway, by Mr. James D. Sheriff, 387
On Tilghman's Sand Blast Process, and its Application for Cutting Stone, &c., by Mr. William E. Newton, 387
Description of a Wrought-Iron Construction of Observatory for Maintaining Equality of Internal and External Temperature, by Mr. Charles Clement Walker, 387
Intelligence, Law, 486
International Communication, M. Dupuy de Lôme on, 127
International Exhibition of 1873, The, 86, 128
International Exhibition, 1874, The London, Civil Engineering Classes at, 348
International Jury at the Vienna Exhibition, List of Members, 6
International Patent Congress, The, at Vienna, 106, 126, 189
International Patent Law, 189
Iron Bridge, New, at Leeds, over the River Aire, 9, 67
Iron Coal Wagons. By the Société Générale d'Exploitation de Chemins de Fer, Tubize, at the Vienna Exhibition, 124, 306
Iron Dwelling Houses, at the Vienna Exhibition, 410
Iron Fortifications, 234
Iron in Germany, The Consumption of, 18
Iron Girder Bridge over the River Ouse at Lynn, Brunlees and McKerrow, Engineers, 444, 463
Iron Industry of Belgium, The, 151, 176

Iron Manufacture, French, 409
Iron Manufacture, The, at the Vienna Exhibition, 19, 97, 179, 255, 285, 309, 467
Iron and Steel Institute, 147, 169
IRON AND STEEL INSTITUTE, THE:
Address of the President, 138
Reply of the President of the Belgian Reception Committee, 139
On Büttgenbach's System of Constructing Blast Furnaces, by Franz Büttgenbach, 150
On the Rationale of the Combustion of Gases, Considered in Relation to an Increased Supply of Heat, by Charles Bontmy, 150
On the Economical Preparation of Iron for the Danks Puddling Furnace, by Charles Wood, 151
On the Rise and Progress of the Iron and Steel Industries in Belgium, by Julien Daby, 151, 176
On Winding and other Appliances for Coal Mining, by William Kamp, 153, 175
On Coke Ovens, by M. Augustus Gillon, 171
On the Diamond Rock Drill, by Major Beaumont, 173, 197
Summary of a Statement entitled "Studies Relative to the Improvements whereof the Construction of Railways is Susceptible," by M. D. Soignie, 173, 196
Statistics of the Manufacture and Commercial Movement of Coke in Belgium, by Max Goebel, 175
On the Mineral Resources of Belgium, by Henier Malherbe, 185, 207
On Phosphor-Bronze, by M. J. Manne, 218
Iron Water Tower. By the Erste Brünner Maschinen-fabriks Gesellschaft, at the Vienna Exhibition, 162
Iron Works, The Bowling, 245
Iron Works, The Seraing, 240
Ironclads, Our, and Naval Science, 89
Irrigation and Railway Works in India, 189
Irrigation in Sutherlandshire, 146

Jacketted Cylinders, Steam, 53
Jersey New Harbour Works, The, 343
Jointing Pipes, 91

Kayser's Needle-Stamping Machine, at the Vienna Exhibition, 237
Kessler's Locomotive for the Carl Ludwigs-Bahn, at the Vienna Exhibition, 113
Keyham, Devonport Dockyard, and Saltash Bridge, Visit of the Institution of Mechanical Engineers to the, 108
Kirkstall Forge Company's Steam Hammers, at the Vienna Exhibition, 121
Krauss's Four-Wheeled Tank Locomotive, at the Vienna Exhibition, 113
Krauss's Tank Locomotive, at the Vienna Exhibition, 304
Krupp's Gun Carriages, at the Vienna Exhibition, 233, 331, 377, 507
Krupp's Guns, at the Vienna Exhibition, 57, 115, 133
Krupp's 12-in. Coast Gun, at the Vienna Exhibition, 187

Launch, Thorneycroft's Steam, "The Firefly," 256
Law Intelligence, 496
Lead Burning, 303
League Island, Philadelphia, A Station at, for the American Navy, 364
Lecture to the Operative Classes at Bradford on Fuel, by Mr. C. W. Siemens, 260
Leeds, New Bridge over the River Aire, 9, 62
Leith Dock Extension, 211
Length of Crank Pins, The, 238
Liége, Annual Provincial Meeting of the Iron and Steel Institute at, 147, 169
Lighthouses, American, 294
Lightning Conductors, 125
List of Members of the International Jury at the Vienna Exhibition, 6
List of Railways in Progress, or Finished, but not Opened, in India, 190
Lithographic Press, Swiderski's, at the Vienna Exhibition, 55
Lithographic Printing Press, Sigl's, at the Vienna Exhibition, 316
Liverpool, Water Supply at, 483
Local Government and Public Health, 363
Locomotive for the Carl Ludwigs-Bahn, at the Vienna Exhibition, 113
Locomotive for the Southern Railway of Austria, at the Vienna Exhibition, 5
Locomotive, Double-Bogie (Meyer's System), at the Vienna Exhibition, 35
Locomotive Engine Wheels, Haswell's Method of Constructing, 15
Locomotive Engineering; The Fairlie System, 395
Locomotive Engines on Common Roads, 66
Locomotive, Express, Sigl's, at the Vienna Exhibition, 274
Locomotive, Goods, for the Kaiserin Elizabeth Railway of Austria, at the Vienna Exhibition, 135
Locomotive, Goods, for the Southern Railway of Austria, at the Vienna Exhibition, 224
Locomotive, Passenger, for the North-Western Railway of Austria, at the Vienna Exhibition, 328
Locomotive, Passenger, Tender for, at the Vienna Exhibition, 205
Locomotive, Tank, 18 in. Gauge, for Tramways at the Royal Dockyard, Chatham, 492
Locomotive, Tank, for the 3 ft. 1½ in. Gauge, at the Vienna Exhibition, 434
Locomotive, Tank. By Krauss and Co., at the Vienna Exhibition, 304
Locomotive Tubes, Machine for Cutting, at the Vienna Exhibition, 286
Locomotives, Austrian, 47
Locomotives, Heavy Goods, 445
Locomotives, Modern, 400
Locomotives, Underground, 393
Locomotives at the Vienna Exhibition, 37, 74, 119, 135, 225, 247, 335, 385, 443, 518
Log Frame, Vertical, Wannieck's, 438
London Gas Companies, The Receipts of, 195
London International Exhibition, 1874, Civil Engineering Classes at the, 349
Lowry's Radial Drilling Machine for the Société John Cockerill, Seraing, 338
Lubricants, Apparatus for Testing, 92
Lyceum of Natural History, New York, Paper read before the, 56
Lynn, Bridge over the River Ouse at, 444, 463

M'Clean, John Robinson, Death of, 68
Machine, Circular Planing. By Ganz and Co., at the Vienna Exhibition, 301
Machine, Coal-Cutting, Firth's, 282
Machine for Double-Boring. By MM. Bede and Co., at the Vienna Exhibition, 142
Machine, Double-Drilling. By Pfaff, Fernau, and Co., at the Vienna Exhibition, 4
Machine, Double-Shaping. By the Werkzeugmaschinen-fabrik Saxonia, at the Vienna Exhibition, 262
Machine, An Early Sewing, 321
Machine, Ice-Making, Vaas and Littmann's, at the Vienna Exhibition, 347
Machine, Lithographic Printing, Sigl's, at the Vienna Exhibition, 316
Machine, Morand's Brick-Making, at the Vienna Exhibition, 415
Machine for Needle-Stamping, Kayser's, at the Vienna Exhibition, 237
Machine, Planing. By Schâne and Sons, at the Vienna Exhibition, 43
Machine, Planing, Sharp, Stewart, and Company's, at the Vienna Exhibition, 351
Machine, Plate-Edge Planing. By the Sächsische Maschinen-fabrik Chemnitzer, at the Vienna Exhibition, 259
Machine, Portable Tyre-Drilling. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 356
Machine for Printing and Folding, The "Victory," at the Vienna Exhibition, 101
Machine, Radial Drilling, Lowry's, for the Société John Cockerill, Seraing, 338
Machine for Rail-Drilling. By Wagner and Company, at the Vienna Exhibition, 137
Machine for Rail-Sawing. By Wagner and Company, at the Vienna Exhibition, 293
Machine, Scrap Shearing. By the Friedrich-Wilhelms-Hütte, 89
Machine, Shaping, Messrs. Sharp, Stewart, and Company's, Manchester, 268
Machine for Shaping Ships' Models, 103
Machine, Shearing, Englerth and Cuhser's, at the Vienna Exhibition, 153
Machine, Slot-Drilling. By the Werkzeugmaschinen-fabrik, Saxonia, at the Vienna Exhibition, 347
Machine for Straightening Rails and Light Girders. By Wagner and Company, at the Vienna Exhibition, 197
Machine, Tile-Making, 530
Machine Tools at the Vienna Exhibition, 14, 148, 161, 310, 456
Machine for Tube Cutting. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 286
Machine for Wall-Drilling. By the Berliner Eisengiesserei und Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 93
Machine for Wheel Cutting and Dividing. By the Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 288
Machinery Exhibits at the International Exhibition of 1873, Additions to the, 86
Machinery for the Manufacture of Silk at the International Exhibition, 128
Machinery for Ore Dressing, 114
Machinery, Pail-Making, 528
Machinery, Printing, at the Vienna Exhibition, 155, 215, 237, 352
Machinery for Rock Boring, 173, 197, 214
Machinery, Soda Water, at the Vienna Exhibition, 192
Machinery, Weaving, at the Vienna Exhibition, 213, 221, 339
Machinery, Wood-Planing, 525
Machinery, Woodworking, at the Vienna Exhibition, 77, 110, 210, 134, 159
Machines for Dyeing and Printing, at the Vienna Exhibition, 479
Machines, Finishing, at the Vienna Exhibition, 373, 416, 450
Machines, Thrashing. By Ransomes, Sims, and Head, at the Vienna Exhibition, 499
Machines, Thrashing, at the Royal Agricultural Society's Show at Hull, 40
Machines, Thrashing, at the Vienna Exhibition, 181, 376, 408
Madeira and Mamoré Railway, Rolling Stock of the, 500
Manning and Wardle's Tank Locomotive (18-in. Gauge) for Tramways at the Royal Dockyard, Chatham, 492
Manufacture of Aërated Waters, Hayward, Tyler and Company's Apparatus for the, 30
Manufacture of Flax in France, 320
Manufacture, The Iron, at the Vienna Exhibition, 19, 97, 179, 255, 285, 309, 467
Manufacture, Paper, at the Vienna Exhibition, 435, 475
I. Raw Materials, 435
II. Chemical Processes, 475
Marine Engine, Compound, 140 horse power, Nominal, By the Stabilimento Tecnico Triestino, Trieste, at the Vienna Exhibition, 461
Marine Engines, Compound, 372
Marsden's Stone Breaker and Engine Combined, 430
Martin's Spinning Machine, Table of Performances (Textile Fabrics), at the Vienna Exhibition, 290
Materials, Raw, for Paper Making, at the Vienna Exhibition, 435
Materials, Raw, at the Vienna Exhibition, 3
Mechanical Engineers, Annual Meeting of the Institution of, 85, 107
MECHANICAL ENGINEERS, THE INSTITUTION OF:
On a Machine for Shaping Ships' Models, by Mr. W. Froude, 103
On Ore-Dressing Machinery, by Mr. Henry T. Ferguson, 114
On Cornish Mines, by Mr. J. H. Collins, 114
On the Application of Portable Engines for Mining Purposes, by Mr. John Richardson, 114
MECHANICAL ENGINEERS—*Continued*:
On a Mechanical Scraper for Removing Incrustation from Water Pipes, by Mr. John Little, 114
On Bracket Chairs for Suspending Double-Headed Rails on the West Cornwall Railway, by Mr. James D. Sheriff, 287
On Tilghman's Sand-Blast Process, and its Application for Cutting Stone, &c., by Mr. William E. Newton, 287
Description of a Wrought-Iron Construction of Observatory for Maintaining Equality of Internal and External Temperature, by Mr. Charles Clement Walker, 287
Medals and Diplomas to Exhibitors at the Vienna Exhibition, 226
Meeting of the American Society of Civil Engineers, 36
Meeting, Annual Provincial, of the Iron and Steel Institute, at Liége, 147, 169
Meeting of the Chesterfield and Derbyshire Institute, 33, 302
Members of the International Jury at the Vienna Exhibition, List of the, 6
Memoir of the late John Robinson M'Clean, 68
Memoir of the late Professor De la Rive, 478
Merryweather's Process of Lead Burning, 303
Merryweather's Steam Fire Engine, at the Vienna Exhibition, 59
Metallic Barometer, Principles and Construction of the, 496, 513
Metals, The Effect of Stress on, 478
Methods for Constructing Lightning Conductors, 125
Metropolitan Gas Supply, The, 165, 502
Meyer and Fairlie Systems, The, 395
Meyer's System of Double-Bogie Locomotive, at the Vienna Exhibition, 35
Meyn's Patent Boiler. By the Actien Gesellschaft der Hollerschen Carlshütte, Rendsburg, at the Vienna Exhibition, 203
Middlesbrough, Proposed Bridge Ferry at, 63
Military Railways, 423, 446
Mill, Cotton, near St. Petersburg, Turbine (1200 horse power) for a. By the Maschinen-fabrik Augsburg, 8
Mill Engine, Danek's Rolling. By the Maschinenbau Actien Gesellschaft, Prague, at the Vienna Exhibition, 124, 206
Mineral Fuel at the Vienna Exhibition, 287, 353, 391, 418, 455
Mineral Produce of Russia, 393
Mineral Resources of Belgium, The, 185, 207
Mines, The Botallack, near the Land's End, Visit of the Institution of Mechanical Engineers, 107
Mines, Carn Brea, Visit of the Institution of Mechanical Engineers to the, 107
Mines, Cornish, 114
Mining in Australia, Tin, 168
Mining, Pollution of Rivers by, 402
Miscellaneous Engines at the Vienna Exhibition, 156
Miscellaneous Exhibits at the Smithfield Club Show, 482
Miscellaneous Implements at the Royal Agricultural Society's Show at Hull, 41
Modern Industrial Progress, 210
Modern Locomotives, 400
Montsouris, The Reservoir of, 361
"Modern Steel," Mr. W. H. Barlow on the Use of, 251
Morand's Brick-Making Machine, at the Vienna Exhibition, 415
Morell's Patent High-Pressure Engine and Boiler, at the Vienna Exhibition, 157
Motion, Parallel, at the Vienna Exhibition, 284
Motor, New Caloric, F. Siemens's, at the Vienna Exhibition, 350
Motors, Hydraulic, at the Vienna Exhibition, 223, 236, 339
Mowing and Reaping Trials at the Vienna Exhibition, 52
Muller's New Gas Apparatus, 426

Nagpoor Water Works, The, 493
Narrow Gauge Railways, 29
Nautical Magazine, The, on Rules of Thumb for Steamship Speed, Power, and Coal in the Merchant Service, 332
Nautical Magazine, The, on the Water-Tube Boilers of the Montana, 366
Naval Engineers, The Royal, 501, 509
Naval Science on Our Ironclads, 89
Navy, The United States, 364
Needle-Stamping Machine, Kayser's, at the Vienna Exhibition, 237
New Aneroid, A, 283
New Bridge at Leeds over the River Aire, 9, 62
New Bridge at Wandsworth, Opening of the, 276
New Caloric Motor, F. Siemens's, at the Vienna Exhibition, 350
New Field Guns, 224
New Gas Apparatus, A, 426
New Harbour Works at Jersey, The, 343
New Harbour Works, Proposed, at Dover, 169
News, Recent Sewage, 276
Non-Condensing Horizontal Engine. By the Berliner Union Actien Gesellschaft, at the Vienna Exhibition, 499
Notes from Cleveland, 10, 28, 45, 71, 83, 111, 124, 143, 165, 183, 207, 235, 246, 271, 303, 315, 340, 369, 387, 405, 427, 442, 463, 487, 505, 520
Notes, Foreign and Colonial, 15, 26, 45, 71, 83, 110, 129, 143, 164, 187, 215, 224, 257, 315, 340, 400, 420, 449, 469, 500
Notes from Germany, 13, 214, 234, 293
Notes from the North, 16, 28, 45, 71, 89, 111, 124, 142, 165, 183, 215, 235, 249, 279, 303, 323, 345, 369, 387, 405, 427, 449, 469, 487, 505, 517
Notes from Paris, 233, 311, 357, 409
Notes on Sewage, 190, 276, 292, 342, 524
Notes from the South-West, 15, 28, 44, 83, 100, 124, 142, 165, 183, 207, 234, 257, 279, 303, 315, 345, 369, 387, 405, 441, 469, 482, 497, 520
Notes from South Yorkshire, 15, 23, 45, 63, 85, 111, 129, 143, 165, 187, 214, 235, 249, 279, 303, 323, 345, 369, 379, 404, 419, 442, 466, 482, 505, 520

OBITUARY:
Chatelier, M. Le, 426
Cowen, Sir J., 520
Professor De la Rive, 478
OBITUARY.—*Continued*:
Eborall, C. W., 513
Fischel, Eugène, 30
Forrest, W. J., 315
Fritz, George, 168
Jackson, Robert, 63
M'Clean, John Robinson, 41
M'Cunn, John, 206
Pease, Charles, 26
Pease, Joseph Beaumont, 26
Ocean Cables, The Repair of, 333
Opening the New Bridge at Wandsworth, 276
Ordnance, Heavy, 236
Ordnance at the Vienna Exhibition, 57, 115, 133, 233, 331, 377, 507
I., II., III., IV. Krupp's Guns, 57, 115, 133
V., VI., VII., VIII. Krupp's Gun Carriages, 233, 331, 377, 507
Ore-dressing Machinery, 114
Orsat's Apparatus for Gas Analysis, 329
Our Ironclads, 89
Ouse, Bridge over the River, at Lynn, 444, 463
Ovens, Coke, 171
Overhead Steam Cranes at the Middlesbrough Docks. By Messrs. Appleby Brothers, 437
Overhead Travelling Cranes. By L. Stuckenholz, at the Vienna Exhibition, 117
Overheated Boiler Plate, 34
Owen Testimonial, The, 344

Pail-Making Machinery, 528
Pan, Heckmann's Vacuum, at the Vienna Exhibition, 55
Pan, Vacuum, for Crystallising Sugar. By F. Hallström, at the Vienna Exhibition, 141
Paper Manufacture at the Vienna Exhibition, 435, 475
I. Raw Materials, 435
II. Chemical Processes, 475
Parallel Motion, at the Vienna Exhibition, 284
Paris, Notes from, 233, 311, 357, 409
Paris Water Supply, 333
Passenger and Goods Traffic on Indian Railways, Receipts from the, 86
Passenger Locomotive for the North-Western Railway of Austria, at the Vienna Exhibition, 328
Passenger Locomotive, Belgian, at the Vienna Exhibition, 205
Patent Congress, The, at Vienna, 106, 126, 189
Patent Law, International, 189
Patents, Report of the Commissioners of, 145
Pattern-Making, Special Machines for. By Richards, London, and Kelley, Philadelphia, 492
Peat, F. Hahn Danchell on, 294
Petroleum Oils, M. Granier's Apparatus for Determining the Temperature of Ignition of, 337
Pfaff, Fernau, and Co.'s Double-drilling Machine, at the Vienna Exhibition, 4
Phosphor-Bronze, 218
Phosphor-Bronze, Experiments on, at Berlin, 67
Pickering's Horizontal Engine, 456
Pipes, Jointing, 91
Planing Machine, Circular. By Ganz and Company, at the Vienna Exhibition, 301
Planing Machine. By Schâne and Sons, Leipzig, at the Vienna Exhibition, 43
Planing Machine. By Messrs. Sharp, Stewart, and Company, at the Vienna Exhibition, 351
Planing, Tonguing, and Grooving Machine for Parquetry, Ganz's, at the Vienna Exhibition, 394
Plate-edge Planing Machine. By the Sächsische Maschinen-fabrik, at the Vienna Exhibition, 259
Plimsoll Commission, The, 275, 319, 401
Pneumatic Relay Apparatus, Crespin and Lapergue's, 206
Pneumatic Telegraphy, 146
Pneumatic Tubes, 423, 460
Pollution of Rivers by Mining, 402
Pollution of the Thames, 467
Popular and Technical Education, Exhibits for, at the Vienna Exhibition, 95
Portable Battery, Stanley's, 16
Portable Crank-pin Turning Machine. By the Sächsische Maschinen-fabrik, at the Vienna Exhibition, 430
Portable Engines, 11, 53
Portable Engines, The Application of, for Mining Purposes, 114
Portable and Fixed Engines at the Smithfield Club Show, 479
Portable and Stationary Engines at the Royal Agricultural Society's Show at Hull, 40
Portable Tyre-Drilling Machine. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 359
Ports and Canals of France, 223
Premiums Awarded by the Institution of Civil Engineers, 24
Preparation of Silk Waste, The, at the Vienna Exhibition, 325
Present Sanitary Arrangements and Cholera, 12, 48
Preserving the Cutting Edges of Engineers' Tools, 195
President of the Iron and Steel Institute, Address of the, 138
Press, Lithographic, Swiderski's, Leipzig, at the Vienna Exhibition, 55
Press for Ridge or Gutter Tiles. By E. Lacis and Co., Trier, at the Vienna Exhibition 117
Press, Wollmann's Beetroot Boiling, at the Vienna Exhibition, 269
Pressure of Gas produced by the Combustion of Explosives, Experiments on the, by MM. Roux and Sarran, 364
Prevention of Railway Accidents, The Best Method for the, 229
Principles of Shop Manipulation for Engineering Apprentices, 430, 448, 474, 513
Printing and Folding Machine, the "Victory," at the Vienna Exhibition, 101
Printing Machinery, at the Vienna Exhibition, 155, 215, 237, 352
Printing Press, Continuous Web. By the Maschinen-fabrik Augsburg, Bavaria, at the Vienna Exhibition, 27
Printing Press, Lithographic, Sigl's, at the Vienna Exhibition, 316
Printing Press, Quadruple, Dialon's, at the Vienna Exhibition, 411

Prizes at the Vienna Exhibition, 214
Process for the Treatment of Sewage, Scott's, 299
Processes, Chemical, for Paper Manufacture, at the Vienna Exhibition, 475
Proclamation by the President of the United States in Relation to the Exhibition in 1876 at Philadelphia, 203
Professor De la Rive, The Late, 473
Professor Thurston's Apparatus for Testing Lubricants, 92
Professor Thurston's Apparatus for Testing Torsional Resistances, 305
Programme of the International Congress of Patents at Vienna, 106
Programme of the Iron and Steel Institute at Liège, 147
Progress in Bridge Building, 287, 341
Progress, Modern Industrial, 210
Projected Gold Coast Railway, The, 422, 446
Projects, Railway, for 1874, 465, 485
Proposed Bridge Ferry at Middlesbrough, 62
Proposed Irrigation Works in India, List of, 199
Proposed Tunnel under the River Humber, Description of the, 65
Propulsion, Screw, 402, 504
Propulsion, Submerged Wire-Rope, 415
Protection from Lightning, 125
Public Health and Local Government, 363
Puddling Furnace, The Danks, 151
Pump, Helical, and Three-Cylinder Engine, Brotherhood and Hardingham's, at the Vienna Exhibition, 264
Pumping Engine, Direct-Acting. By Decker Brothers, at the Vienna Exhibition, 271
Pumping Engines, Compound, at the Eaton Mines, Middlesbrough-on-Tees, 294
Pumping Engines. By the Erste Brünner Maschinen-fabriks Gesellschaft, at the Vienna Exhibition, 241
Pumping Engines, The Ferrara, 67, 500
Pumping Engines at Worthington, Belmont, Reports upon the, 17
Pumping Machinery, Gwynne's Centrifugal, 67, 500
Pumps, Steam, in the Vienna Exhibition, 31
Pumps, Tar, at the Stalybridge Gas Works, Constructed by G. Gimson, Stalybridge, 329
Punching and Shearing Machine, Englerth and Cünzer's, at the Vienna Exhibition, 153

Quadruple Printing Press, Bialon's, at the Vienna Exhibition, 411
Question, The Coal, 209, 230

Radial Drilling Machine, Lowry and Co.'s, for the Société John Cockerill, Seraing, 336
Rail-Drilling Machine. By Wagner and Company, at the Vienna Exhibition, 197
Rail-Sawing Machine. By Wagner and Company, at the Vienna Exhibition, 200
Rail-Straightening Machine. By Wagner and Company, at the Vienna Exhibition, 197
Railway Accidents, 229, 252, 466
Railway Carriages, Weibel, Briquet, and Co.'s System of Warming, at the Vienna Exhibition, 166
Railway Construction, Improvement in, 173, 196
Railway, Grand Trunk, of Canada, Change of Gauge on the, 357
Railway Projects for 1874, 465, 485
Railway Rolling Stock, at the Vienna Exhibition, 138, 199, 243, 317, 407, 429, 489, 511
Railways, Indian, 86
Railways and Irrigation Works in India, 189
Railways and Locomotives in Austria, 47
Railways, Military, 423, 446
Railways, Narrow Gauge, 29
Railways of the United Kingdom, 516
Railways, United States, 446
Ransomes' Threshing Machines, at the Vienna Exhibition, 409
Raising Coal, 153, 175
Raw Materials (Textile Industry), at the Vienna Exhibition, 2
Raw Materials for Paper Making, at the Vienna Exhibition, 435
Reapers and Mowers, American, at the Vienna Exhibition, 68, 88
Reaping Trials at the Vienna Exhibition, 52
Recent Sewage News, 276
Reed, Mr. E. J., on Our Ironclads, in *Naval Science*, 99
Register, Wreck, 1872, 436
Registering Tides, Reitz's Instrument for, at the Vienna Exhibition, 82
Reinecke's Horizontal Engine, at the Vienna Exhibition, 102
Relay Apparatus, Pneumatic, Crespin and Lapergue's, 206
Repair of Ocean Cables, The, 252
Repairs to the Atlantic Cables, 253
Reply of the President of the Belgian Reception Committee to Mr. I. L. Bell's Address at Liège, 159
Report of Commission in France on Dynamite, 511
Report of the Commission on Scientific Education, 424
Report of the Commissioners of Patents, 145
Report of the Royal Commission on British Shipping, 275, 319, 491
Report of the Select Committee on the Coal Question, 209, 230
Report of Mr. Waugh on the Boiler Explosion at Bradford, 149
Reports upon the Worthington Pumping Engines at Belmont, 17
Reservoir of Montsouris, The, 361
Resistance of Materials, The Torsional, 305
Results of Experiments with Whitbread's Sewage Process, 33
Rheims, The Sewage System of, 364
Richards's Special Machines for Pattern-Making, 432
Ridge or Gutter Tiles, Press for. By E. Lacis and Co., at the Vienna Exhibition, 117
Rise and Fall of the Tides, Reitz's Apparatus for Registering, at the Vienna Exhibition, 82
"Rietzinger," The, Express Locomotive, at the Vienna Exhibition, 5, 274
Rive, Professor De la, The late, 473
River Aire, Leeds, New Bridge over the, 9, 62
River Humber, Proposed Tunnel under the, 65
River Ouse, Bridge over the, at Lynn, 444, 463
River Thames, Pollution of the, 467
River Vanne, Reservoir at Montsouris for the Water of the, 361
Rivers, Pollution of, by Mining, 402
Rock-Boring Machinery, 173, 197, 214
Rolling Loads, The Bracing of Bowstring Girders under, 265
Rolling Mill Engine, Danek's, at the Vienna Exhibition, 134, 206
Rolling Mill Engines, at the Vienna Exhibition, 39
Rolling Press, Wollmann's Beetroot, at the Vienna Exhibition, 268
Rolling Stock for the Madeira and Mamoré Railway, 500
Rolling Stock, Railway, at the Vienna Exhibition, 138, 199, 243, 317, 407, 429, 489, 511
Rope Tramways, 373
Rotary Engine, Dudgeon's, 396
Roux and Sarran, MM., on Explosive Compounds, 365
Royal Academy of Industry at Berlin, Experiments on Phosphor-Bronze at the, 87
Royal Agricultural Society's Show at Hull, The, 30, 40
Royal Dockyard, Chatham, Tank Locomotive, (18 in. gauge) for Tramways at the. By Manning, Wardle, and Co., 492
Royal Naval Engineers, The, 501, 509
Rules of Thumb for Steamship Speed, Power, and Coal, in the Merchant Service, 298, 302, 323
Russell, Mr. J. Scott, and M. Dupuy de Lôme, on International Communication, 127
Russia, Mineral Produce of, 393

Sabine, Mr. R., on Pneumatic Tubes, 433, 460
Saltash Bridge, Keyham, and Davonport Dockyard, &c., Visit of the Institution of Mechanical Engineers to the, 106
Sand Blast, The, 271, 287
Sands of Fontainebleau, The, 415
Sanitary Arrangements, The Present, and Cholera, 12, 44
Sanitary Fittings and Drainage of the Vienna Exhibition, 459
Saturn Matches—Briquets de Saturne, 499
Saw Frame for Cutting Logs, Wannieck's, 438
Schäne and Sons' Planing Machine, at the Vienna Exhibition, 42
Schultz and Göbel's Fifty-Hundredweight Single-Acting Steam Hammer at the Vienna Exhibition, 142
Science of Hydrodynamics, The, 13
Science Exhibits at the Vienna Exhibition, 116, 177, 266, 333, 365, 425, 490, 524
Scientific Education, 424
Scott's Sewage Cement Process, 299
Scrap Shearing Machine. By the Friedrich-Wilhelms-Hütte, at the Vienna Exhibition, 80
Scraper, Mechanical, for Removing Incrustation from Water Pipes, 114
Screw Propulsion, 402, 504
Sea, Collisions at, 484
Select Committee on the Coal Question, Report of the, 209, 230
Self-Moving Anchor, Greenslade's, 54
Semi-fixed Engines, or Combined Engines and Boilers, at the Vienna Exhibition, 3
Sersing Works, The, 240
Session, 1873-74, of the Institution of Civil Engineers, Subjects for Papers, 368
Sewage Cement Process, Scott's, 299
Sewage Difficulties, 342
Sewage and Fever, 521
Sewage Grass and Typhoid Fever, 145
Sewage News, Recent, 276
Sewage, Notes on, 190, 276, 299, 342, 524
Sewage Process, Whitbread's, 33
Sewage System of Rheims, The, 364
Sewing Machine, An Early, 321
Shafting, Cold Rolled, at the Vienna Exhibition, 75
Shah, H.M.S., Armament of, 167
Shand, Mason, and Company's Steam Fire Engines, at the Vienna Exhibition, 102, 258
Shaping Machine, Double. By the Werkzeugmaschinen-fabrik Saxonia, at the Vienna Exhibition, 262
Sharp, Stewart, and Company's Planing Machine, at the Vienna Exhibition, 351
Sharp, Stewart, and Company's Shaping Machine, 268
Shearing Machine, Englerth and Cünzer's, Eschweiler Aue, at the Vienna Exhibition, 153
Shearing Machine, Heavy. By the Friedrich-Wilhelms-Hütte, 80
Shells of Boilers, The Strength of, 270
Ships' Models, Machine for Shaping, 103
Shop Manipulation for Engineering Apprentices, Principles of, 430, 448, 474, 513
Show, The Smithfield Club, 479
Siemens, Mr. C. W., on Fuel, 260
Siemens' New Caloric Motor, at the Vienna Exhibition, 350
Sigl's Express Locomotive for the Southern Railway of Austria, at the Vienna Exhibition, 5, 274
Sigl's Goods Locomotive for the Southern Railway of Austria, at the Vienna Exhibition, 224
Sigl's Horizontal Engine, at the Vienna Exhibition, 348
Sigl's Lithographic Printing Press, at the Vienna Exhibition, 316
Sigl's Passenger Locomotive for the North-Western Railway of Austria, at the Vienna Exhibition, 328
Silk, Machinery for the Manufacture of, at the International Exhibition, 128
Silk Waste, The Preparation of, at the Vienna Exhibition, 324
Single-Acting Steam Hammer, Fifty-Hundredweight, Schultz and Göbel's, at the Vienna Exhibition, 142
Six-Horse Traction Engine and Crane, Aveling and Porter's, 102
Sketch of the Life of the Late George Fritz, 168
Slot-Drilling Machine. By the Werkzeugmaschinen-fabrik, Saxonia, at the Vienna Exhibition, 347
Smithfield Club Show, The, 479
Société John Cockerill Iron Works at Seraing, Description of the, 240
Society of Austrian Engineers and Architects, The, 24
Society for the Promotion of Scientific Industry, Delegates of the, at the Vienna Exhibition, 59
Soda Water Machinery, at the Vienna Exhibition, 192
Somerset and Devon Railway, Inspection of the, 327
Somerville's Mode of Jointing Pipes, 91
Sone Canals, The, 219, 312
Southern Railway of Austria, Sigl's Express Locomotive for the, 5
South-West, Notes from the, 15, 28, 44, 83, 100, 124, 142, 165, 183, 207, 234, 257, 279, 303, 315, 345, 369, 387, 405, 441, 469, 482, 497, 520
South Yorkshire, Notes from, 15, 28, 45, 63, 83, 111, 129, 143, 165, 187, 214, 235, 249, 279, 303, 323, 345, 369, 379, 404, 419, 442, 463, 482, 505, 520
Special Machines for Pattern-Making. By Richards, London, and Kelley, 432
Spinning Machinery, Wool, at the Vienna Exhibition, 273, 289
Spooner's Double-Bogie Composite Carriage for the Festiniog Railway, 386
Spring Washer, Grover's, 43
Stackers and Elevators at the Royal Agricultural Society's Show at Hull, 40
Stamping Machine for Needles, Kayser's, Constructed by G. Printz, Aix-la-Chapelle, at the Vienna Exhibition, 237
Stanley's Portable Battery, 16
Stationary Boilers. By Bolzano, Tedesco, and Company, at the Vienna Exhibition, 454
Stationary Engine, Test of a, 490
Stationary Engines at the Vienna Exhibition, 3, 59, 156, 307
IV. Combined Engines and Boilers, or Semi-Fixed Engines, 3
V. Winding Engines, 59
VI. Vertical Engines. Miscellaneous, 156
VII. Conclusion, 307
Stationary and Portable Engines at the Royal Agricultural Society's Show at Hull, 40
Statistics of Railway Accidents in 1872, 252
Steam Cultivating Machinery at the Royal Agricultural Society's Show at Hull, 40
Steam Expansion Curves, 382
Steam Fire Engine. By Merryweather and Sons, at the Vienna Exhibition, 59
Steam Fire Engines, Shand, Mason, and Co.'s, at the Vienna Exhibition, 102, 258
Steam Hammer, Double-Acting. By the Chemnitzer Werkzeugmaschinen - fabrik, at the Vienna Exhibition, 17
Steam Hammer, 15-ton, By the Märkische Maschinenbau Anstalt, at the Vienna Exhibition, 102
Steam Hammer, High-Speed, Brinkmann and Company's, at the Vienna Exhibition, 361
Steam Hammers. By the Kirkstall Forge Company, at the Vienna Exhibition, 121
Steam-Jacketted Cylinders, 11, 53
Steam Launch, The "Firefly," Thorneycroft's, 236
Steam-Ploughing Engines and Tackle, and Traction Engines, at the Smithfield Club Show, 479
Steam Pumps, at the Vienna Exhibition, 31
"Steam Sappers" for the Gold Coast Railway, 422, 446
"Steam Striker," Davies', at the Vienna Exhibition, 182
Steam Travelling Crane, Two-ton, J. H. Wilson and Company's, at the Vienna Exhibition, 337
Steamer, Channel, The Diecy, 522
Steamship Montana, Water-Tube Boilers of the, 191
Steamship Speed, Power, and Coal, in the Merchant Service, Rules of Thumb for, 298, 302, 323
Steel and Iron Institute, The:
Address of the President, 158
Reply of the President of the Belgian Reception Committee, 159
On Büttgenbach's System of Constructing Blast Furnaces, by Franz Büttgenbach, 150
On the Rationale of the Combustion of Gases Considered in Relation to an Increased Supply of Heat, by Charles Bontmy, 150
On the Economical Preparation of Iron for the Danks Puddling Furnace, by Charles Wood, 151
On the Rise and Progress of the Iron and Steel Industries in Belgium, by Julien Deby, 151, 176
On Winding and other Appliances for Coal Mining, by William Kamp, 153, 175
On Coke Ovens, by M. Augustus Gillon, 171
On the Diamond Rock Drill, by Major Beaumont, 173, 197
Summary of a Statement Entitled "Studies Relative to the Improvements wherewf the Construction of Railways is Susceptible," by M. D. Soiguis, 173, 196
Statistics of the Manufacturing and Commercial Movement of Coke in Belgium, by Max Goebel, 175
On the Mineral Resources of Belgium, by Renier Malherbe, 186, 207
On Phosphor-Bronze, by M. J. Mauss, 218
Steel, The Use of, 251
Steel Works, Hallside, Glasgow, 344
Stone-Breaker and Engine Combined, Marsden's, 430
Storm at Vienna, The, 15
Straightening Rails and Light Girders, Machine for. By Wagner and Co., at the Vienna Exhibition, 197
Straw-Burning Engine, Head and Schemioth's, Trial of, at Vienna, 147
Strength of Boiler Shells, 270
Stress on Metals, The Effect of, 478
Subjects for Papers, Session 1873-74, of the Institution of Civil Engineers, 368
Submarine Cables, Accidents to, 277
Sugar from Beetroot, The Production of, in Germany, 18
Sugar-Making, Beetroot, Hallström's Apparatus for, at the Vienna Exhibition, 10
Sulzer Brothers' Boiler and Feed-Water Heater, at the Vienna Exhibition, 281
Sulzer Brothers' Horizontal Condensing Engine, at the Vienna Exhibition 281
Sulzer Valve Gear, Horizontal Engine with, at the Vienna Exhibition, 44
Sulzers' Engines for Submerged Wire-Rope Propulsion, 415
Supply of Gas, The Metropolitan, 105, 502
Supply of Water at Liverpool, 483
Supply of Water for Paris, The, 338
Sutherlandshire, Irrigation in, 146
Swiderski's Lithographic Press, at the Vienna Exhibition, 55
Switzerland at the Vienna Exhibition, 157
"System Büttgenbach" Blast Furnaces, 123
System, The Fairlie, 395

Table of Experiments on Phosphor-Bronze at Berlin, 87
Table of Performances of the "Dingler Engine," at the Vienna Exhibition, 164
Table of Performances of M. Martin's Spinning Machine (Textile Fabrics), at the Vienna Exhibition, 290
Table Showing Results obtained with Meyn's High-Pressure Boiler, at the Vienna Exhibition, 204
Tank Locomotive (18-in. Gauge) for Tramways at the Royal Dockyard, Chatham, 492
Tank Locomotive, Krauss and Co.'s, Munich, at the Vienna Exhibition, 304
Tank Locomotive for the 3 ft. 1½ in. Gauge, at the Vienna Exhibition, 434
Tar Pumps at the Stalybridge Gas Works, Constructed by Gimson, Stalybridge, 329
Technical and Popular Education, Exhibits for, at the Vienna Exhibition, 89
Tedesco's Stationary Boilers, at the Vienna Exhibition, 454
Telegraphy, Pneumatic, 146
Tender and Locomotive for the Carl Ludwigs-Bahn, at the Vienna Exhibition, 113
Tender for Passenger Locomotive, at the Vienna Exhibition, 268
Test of a Stationary Engine, 490
Testimonial, The, to Mr. F. C. Owen, 344
Testing Lubricants, Apparatus for, 92
Tests of the Worthington Pumping Engines at Belmont, Reports upon the, 17
Textile Industry at the Vienna Exhibition, 1, 69, 129, 194, 213, 221, 239, 273, 289, 325, 339, 359, 373, 416, 450, 470
I. Introduction, 1
II. General Review of Textile Machinery; Woollen Industry, 69
III. Silk and Cotton-Spinning Machinery, 129
IV. Flax, Hemp, and Juta-Spinning Machinery, 194
V., VI., VII., XI. Weaving Machinery, 213, 221, 239, 339
VIII., IX. Wool-Spinning Machinery, 273, 289
X. The Preparation of Silk Waste, 325
XII. Fringe-Making Machinery, 359
XIII., XIV., XV. Finishing Machines, 373, 416, 450
XVI. Machines for Dyeing and Printing, 470
Thames, Pollution of the, 467
Thrashing Machines, Ransomes, Sims, and Head's, at the Vienna Exhibition, 409
Thrashing Machines at the Royal Agricultural Society's Show at Hull, 40
Thrashing Machines, at the Vienna Exhibition, 181, 378, 408
Three-Cylinder Engine and Helical Pump, Brotherhood and Hardingham's, at the Vienna Exhibition, 264
Thorneycroft's Steam Launch, "Firefly," 236
Thumb, Rules of, for Steamship Speed, Power and Coal, in the Merchant Service, 298, 302, 323
Thurston, R. H., on the Torsional Resistance of Materials, 305
Thurston's, R. H., Apparatus for Testing Lubricants, 92
Tide Register, Reitz's Apparatus for a, at the Vienna Exhibition, 82
Tile-Making and Brick Machinery, at the Vienna Exhibition, 290
Tile-Making Machine, 530
Tiles, Ridge or Gutter, Press for. By E. Lacis and Co., at the Vienna Exhibition, 117
Tillage Implements at the Vienna Exhibition, 457, 473, 494, 527
Tin and Copper Mine, Dolcoath, Visit of the Institution of Mechanical Engineers to the, 107
Tin Mining in Australia, 168
Tin Smelting Works, Bolitho's, Penzance, Visit of the Institution of Mechanical Engineers, 107
Tools, Engineers', Preserving the Cutting Edges of, 155
Tools, Machine, at the Vienna Exhibition, 14, 148, 161, 310, 456
Tonguing, Planing, and Grooving Machine, Ganz and Co.'s, at the Vienna Exhibition, 394
Torsional Resistance of Materials, On the, 305
Traction Engine, Six-horse, and Crane, Aveling and Porter's, 102
Traction Engines, Experiments with, at the Vienna Exhibition, 53
Traction Engines and Steam-ploughing Engines and Tackle, at the Smithfield Club Show, 479
Traffic on the Austrian Railways, General Description of the, 47
Trains, Hospital, at the Vienna Exhibition, 49
Trials of Implements and Machinery at the Royal Agricultural Society's Show at Hull, 40
Trials of Reaping and Mowing Machines at the Vienna Exhibition, 52
Tramways, Rope, 373
Travelling Crane, Hand. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 284
Travelling Cranes, Overhead, By L. Stuckenholz, at the Vienna Exhibition, 117
Travelling Cranes, Overhead, at the Middlesbrough Docks, Constructed by Messrs. Appleby Brothers, 437
Tube-Cutting Machine. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 286
Tubes, Pneumatic, 433, 460

Tunnel, The Channel, 473
Tunnel, The Humber, 65
Turbine (1200 horse power) for a Cotton Mill near St. Petersburg, By the Maschinen-fabrik Augsburg, 8
Turning, The Art of, 70
Turning Machine, Crank-Pin, Portable. By the Sächsische Maschinen-fabrik, at the Vienna Exhibition, 420
Turntable for the North-Western Railway of Austria. By the Grazer Waggon Maschinenbau und Stahlwerks-Gesellschaft, at the Vienna Exhibition, 216
Twelve Hundred Horse Power Turbine for a Cotton Mill, near St. Petersburg. By the Maschinen-fabrik Augsburg, 8
Twelve-Inch Gun and Carriage, Breechloading, for Coast Defence, Krupp's, at the Vienna Exhibition, 187
Two-Ton Travelling Crane. By J. H. Wilson and Company, at the Vienna Exhibition, 227
Typhoid Fever and Sewage Grass, 145
Tyre-Drilling Machine, Portable. By the Chemnitzer Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 358

Unarmoured Cruiser, H.M.S. Shah, General Description of, 167
Underground Conveyance of Beetroot Juice, 496
Underground Locomotives, 393
United Kingdom, Railways of, 516
United States Arsenal, The Bridesburg, 344
United States Lighthouses, 294
United States Navy, The, 364
United States Railways, 446
Universal Exhibition at Vienna, Closing of the, 361
Universal International Exhibition at Philadelphia, America, 1876, 202
Use of Derrick Cranes, A Caution in the, 389
Use of Steel, The, 251
Utilisation of Sewage, Notes on the, 190, 276, 299, 343, 524

Vaas and Littmann's Iron-making Machine, at the Vienna Exhibition, 347
Vaccuum Pan, F. Hallström's, at the Vienna Exhibition, 141
Vacuum Pan, Heckmann's, at the Vienna Exhibition, 55
Valve Gear for Corliss Engines, Wannieck and Koppner's Patent, at the Vienna Exhibition, 346
Valve Gear, Sulzer's, Horizontal Engine with. By the Maschinen-fabrik Augsburg, at the Vienna Exhibition, 44
Valve Gear, Wood's Corliss, Details of Compound Engine with. By J. and E. Wood, Bolton, 421
Vertical Compound Engine. By Messrs. Schneider, at the Vienna Exhibition, 513
Vertical Engine and Boiler. By Davey, Paxman, and Company, at the Vienna Exhibition, 295
Vertical Engines at the Vienna Exhibition, 186
Vertical Log Frame, Wannieck's, 438
Vesle, The River, and the Sewage of Rheims, 364
"Victory" Printing and Folding Machine, The, at the Vienna Exhibition, 101
VIENNA EXHIBITION, THE:
Agricultural Implements, 68, 88, 181, 378, 408, 457, 473, 494, 527
Art Castings, 73, 231, 332, 413
Awards, 226
Boilers, 29
Brick and Tile Making, 290
Civil Engineering, 356
Closing of the, 361
Cold Rolled Shafting, 75
Cranes and Hoisting Machinery, 267, 314
Diplomas of Honour, 152, 183, 226, 276
Distribution of Silver Medals to Meritorious Foremen and Workmen, 276
Drainage and Sanitary Fittings, 439
Educational Exhibits, 95
Engine Trial, 147
English Artisans, 50
Hospital Trains, 49
Hydraulic Motors, 222, 326, 389
Iron Manufacture, 19, 97, 179, 255, 285, 309, 467
List of Members of the International Jury, 6
Locomotives, 37, 74, 119, 155, 225, 247, 335, 385, 445, 518
Machine Tools, 14, 148, 161, 310, 456
Mineral Fuel, 287, 353, 391, 418, 455
Ordnance, 57, 115, 183, 253, 331, 377
Paper Manufacture, 435, 475
Patent Congress, 106
Printing Machinery, 155, 213, 337, 352
Prizes, 214
Railway Rolling Stock, 158, 199, 243, 317, 407, 429, 489, 511
Scaping Trials, 88
Science Exhibits, 116, 177, 266, 333, 365, 425, 490, 524
Soda Water Machinery, 192
Stationary Engines, 3, 30, 156, 307
Steam Pumps, 91
Textile Industry, 1, 69, 129, 194, 213, 221, 239, 275, 288, 295, 339, 358, 373, 416, 450, 479
Traction Engines, 53
Water Works, 218
Wood-working Machinery, 77, 110, 120, 134, 159
Vienna Exhibition and *The Engineer*, 381
Vienna Exhibition, Fire at the, 110
Vienna, The International Patent Congress at, 105, 126, 189
Vienna Exhibition Water Supply, *The Engineer* on the, 89
Vienna, The Storm at, 15
Vienna Water Works, The, 218

Wagner's Rail-Drilling Machine, at the Vienna Exhibition, 137
Wagner's Rail-Sawing Machine, at the Vienna Exhibition, 293
Wagner's Rail-Straightening Machine, at the Vienna Exhibition, 197
Wagon, Coal, Wheels for, at the Vienna Exhibition, 206
Wagon, Covered Goods. By the Bulna Wagon Works, at the Vienna Exhibition, 72
Wagon, Iron Coal, By the *Société Générale d'Exploitation de Chemins de Fer*, Tubize, at the Vienna Exhibition, 124
Wall Drill, By the Berliner Eisengiesserei und Werkzeugmaschinen-fabrik, at the Vienna Exhibition, 93
Wannieck and Koppner's Valve Gear for Corliss Engines, at the Vienna Exhibition, 346
Wannieck's Vertical Log Frame, 438
Wanted, Information, 341
Warming Railway Carriages, Thamm and Rothmüller's System, 159
Warming Railway Carriages, Weibel, Briquet, and Co.'s System of, at the Vienna Exhibition, 186
Washer, Grover's Spring, 43
Water Gas, 128
Water Heaters, Davey, Paxman, and Company's, 92, 510
Water Supply at Liverpool, 481
Water Supply of Paris, The, 205
Water Supply of the Vienna Exhibition, *The Engineer* on the, 89
Water Tower at the Vienna Exhibition, 162
Water-Tube Boilers of the Steamship Montana, The, 191
Water-Tube Boilers of the Steamship Montana, The *Nautical Magazine* on the, 260
Water Works, The Nagpoor, 498
Water Works, The Vienna, 218
Weaving Machinery at the Vienna Exhibition, 213, 221, 239
Web, Continuous, Printing Press. By the Maschinen-fabrik, Augsberg, at the Vienna Exhibition, 22
Weibel, Briquet, and Co.'s System of Warming Railway Carriages, at the Vienna Exhibition, 186
West of England China Clay Works, Drinnick Mill, Visit of the Institution of Mechanical Engineers to the, 108
Wheels for Coal Wagons, at the Vienna Exhibition, 206
Wheel-Cutting Machine, By the Werkzeugmaschinen-fabrik, Chemnitz, at the Vienna Exhibition, 358
Wheels, Locomotive Engine, Haswell's Method of Constructing, 15
Whitbread's Sewage Process, 23
Wilson's Two-ton Steam Travelling Crane, at the Vienna Exhibition, 227
Winding Engines at the Vienna Exhibition, 59
Wire Rope Propulsion, Submerged, 415
Wollmann's Bestroot Rolling Press, at the Vienna Exhibition, 268
Wood-Planing Machinery, 325
Wood-Working Machinery, at the Vienna Exhibition, 77, 110, 120, 134, 159
Wool-Spinning Machinery, at the Vienna Exhibition, 272, 289
"Working Drawings," A Caution, 50
Workmen's Iron Dwelling Houses, at the Vienna Exhibition, 410
Works, The Bowling Iron, 245
Works, Irrigation, and Railways, in India, 189
Works at Jersey, The New Harbour, 349
Works, The Sereing, 240
Worthington Pumping Engines at Belmont, Reports upon the, 17
Wreck Register, 1872, 436
Wrought-Iron Observatory, A, 347

LITERATURE.

BOHA-FIDE Pocket Dictionary of the French and English Languages, on an Entirely New System, The. By John Bellows, 191

Dictionnaire Technologique dans les Langues Française, Anglaise, et Allemande. Par Alexander Tolhausen, tradacteur près la Chancellerie des Brevets d'Inventions à Londres; et Louis Tolhausen, Consul de France à Leipzig, 191

Dictionary of Terms used in Architecture, Building, Engineering, Mining, Metallurgy, Archæology, the Fine Arts, &c. By John Weale. Edited by Robert Hunt, 191

Elementary Treatise on Natural Philosophy. By A. P. Deschanell. Translated and Edited by J. D. Everett, M.A., D.C.L., F.R.S.E. Parts III. and IV., 361

Long-Span Railway Bridges (Revised Edition). Comprising Investigations of the Comparative Theoretical and Practical Advantages of the Various Adopted or Proposed Type Systems of Construction. With Numerous Formulæ and Tables giving the Weight of Iron and Steel required in Bridges from 200 ft. to the Limiting Spans. To which are added Similar Investigations and Tables Relating to Short-Span Railway Bridges. By B. Baker, 25

Reprint of Papers on Electrostatics and Magnetism. By Sir William Thomson, D.C.L., 308

Sanitary Engineering: A Guide to the Construction of Works of Sewerage and House Drainage, with Tables for Facilitating the Calculations of the Engineer. By Baldwin Latham, C.E., 447

Treatise on the Manufacture of Sugar from the Sugar Cane, A. By Peter Soames, 234

PARAGRAPHS.

ABERDEEN, Harbour Works, Progress of the, 28, 79, 111, 279
Aberdeen Water Storage Accommodation, 345
Accident to Mr. Sandford Fleming, C.E., 45
Across North America, 420
Additional Water Supply for Edinburgh, Proposed, 71
Adelaide, Glenelg, and Suburban Railway, Opening of the, 256
Adelaide and Glenelg Railway, Trial Trip with Horses on the, 187
Adelaide and Port Darwin Railway, Progress of, 400
Adelaide, Proposed New Reservoir at, 71
Additions and Improvements to Works at Sheffield, 249, 345
Agate, Brazilian, 449
Agricultural Society, Manchester and Liverpool, Annual Show of the, 237
Agricultural Society of Scotland, The Highland, 16
Air Brake, The Westinghouse, Trial of, 413
Air-Compressing Chamber, Bursting of an, 520
Air Gas, Wright's Patent, 23
Air Line Railroad, Proposed New, at Philadelphia, 230
Alabama, The Principal Ironfields in, 187
Alexandra Dock Company, Newport, The, 207
Alexandra Palace, New, Progress of the, 462
Alfred, Victoria, Graving Dock, Progress of the, 292
Algeria, Iron Ore from, 505
Algerian Minerals, The Probable Production of, 375
Allan Line of Steamships, Lengthening of the, 216
Allan, Sir Hugh, and the Canadian Pacific Railway, 100
Alleghany Coalfields, The Extent of, 187
Alloa Harbour Improvements, Estimates for, 29
Amalgamation of the Blyth and Tyne and North-Eastern Railway Companies, 405
Alsace and Lorraine, French Rails for, 25
Alteration on Stobeross Ferry, Proposed, 517
Alterations at Blochairn Iron Works, 487
Alterations, Contemplated, at Barnstaple Dock Works, 505
Amalgamation of the Pontnewynydd Works, Pontypool, 482
America, The Southern States of, and Liverpool, 223
American Army, The, 492
American Bridge Building, 15
American Bridges, 163
American Coal and Iron, Investments by English Capitalists in, 215
American Coalfields, The Extent of, 99
American Cotton Manufacture, 110
American Gentlemen at Cardiff Docks, 28
American International Exhibition of 1876, The, 427
American Irrigation, 427
American Liners, The Cunard, Construction of on the Clyde, 235
American Locomotive, The First, 474
American Mail Service, The, 420
American Minerals, The Discovery of, 376
American Mining Operations, 420
American Narrow Gauge Railways, 25
American Officers in Europe, 83
American Pacific Mail Steamship Company, Yearly Receipts of the, 4
American Petroleum, The Exports of, 25
American Railroad Centre, An, 415
American Railroad Contract, A New, 400
American Railway Progress, 257
American River and Harbour Improvements, 500
American Round House for Locomotives, 71
American Scales, Fairbank's, Increased Manufacture of, 469
American Steam Boiler Experiments, 493
American Steam Navigation, 71, 92, 227
American Steam Shipbuilding, 372
American Telegraphy, 80, 274
American Torpedo Boat, An, 493
Americans, The, and the Arctic Regions, 113
Americans at Vienna, The 27
Analyst, Public, for the Strand District, Appointment of, 315
Anglo-Australian Telegraphy, 25
Another Demand for Increase of Wages by the Pitmen of Durham, 304, 387
Another Great Ship Canal, 348
Another Railway near Middlesbrough, 427
Another Reduction in Wages at Sheffield, 482
Annual Demonstration of the South Yorkshire Miners, 63
Annual Meeting of the Auckland Gas Company, New Zealand, 420
Annual Report of S. Fox and Company, Stockbridge, Sheffield, 143
Anstruther Harbour Works, Progress of the, 98
Anthracite Coal, American, Analysis of, 129
Antipodean Telegraphy, 41
Applegarth, Mr., at Sheffield, 83
Appliances for the Economic Consumption of Fuel, Exhibition of, 432
Applied Mechanics and Marine Engineering, Lectures on, in Scotland, 323
Appointment of Chief Engineer to the New York Docks, 111
Arbitration, A Strike Settled by, 468
Arbitration Meeting at Cardiff on the Mines Regulation Act, 26
Arbitration, The Severn Bridge and Railway, 100
Argentine Railways, Progress of, 434
Artillery, German, 178
Artillery, Prussian, Experiments with, 83
Art and Science Department of the South Kensington Museum, 122
Artisans' Report on the Vienna Exhibition, 293
Artisans' Visit to the Vienna Exhibition, 75
Ashantee War, The, and the Steam Sappers, 505
Asia Minor, Mining in, 315
Association for the Advancement of Science, The French, 96
Association of Engineering and Shipbuilding Draughtsmen, Glasgow, Meeting of the, 405, 449
Association of Ironworkers, Headquarters of the, 387
Atlantic Steaming, Plan Proposed for Minimising, 165
Atlantic Steamship Company, The South Wales, 28
Atlas Works, Sheffield, J. Brown and Company, Strike at, 505
Anchertarder, Boring for Coal at, 165
Augmentation of Huddersfield Water Supply, 369
Austria, The Production of Coal in, 352
Australia and San Francisco, New Line of Steamers between, 505
Australian Mail Service, The, 136
Australian Overland Telegraph, The, 313, 469
Avonmouth Docks, Progress of the, 28, 257
Award of a Telford Medal to Mr. Deas, C.E., 26
Awards at the Vienna Exhibition, 183
Axles, Steel Crank, 122
Axle and Wheel-Tyre Company, Owen's, Rotherham, 249, 379
Ayr Harbour Works, Progress of the, 111
Ayrshire Mining Institute, Progress of the, 235

Baldwin Locomotive Works, Philadelphia, Progress of, 164, 215, 376, 429, 469, 495
Ballarat and Maryborough Railway, Victoria, Progress of the, 449
Ballater, Scotland, New Water Works at, 349
Ballooning across the Atlantic, 80
Baltimore, Discovery of Iron Ore at, 110
Baltimore and Ohio Railroad, Proposed New Depôt for the, in Washington, 340
Baltimore and Potomac Railroad, Completion of Tunnel for the, 83
Baltimore, The Water Supply of, 300
Barnsley, Conference on the Coal Question at, 235
Barnstaple and Ilfracombe Railway, Progress of the, 142
Barracks, New, for Glasgow, 215, 279
Barry Island, near Cardiff, Sale of, 44
Bateman, Mr., at Buenos Ayres, 187, 434
Bath, New Water Works at, 62
Bath Stone, Discovery of a Large Tract of, 183
Bathgate, Patent Fuel Works at, 255
Battling with the Ocean, 339
Beaufort Iron Works, The Stoppage of, 405
Bed of the Pacific, Specimens of the, 315
Belgian Coal, Exports of, 187, 415
Belgian Coal Trade, The, 5, 23, 187, 304, 315, 394, 415, 420, 506
Belgian Colliery Company, New, 215
Belgian Gas Enterprise, 376
Belgian Iron, Exports and Imports of, 300, 419
Belgian Iron Trade, The, 48, 66, 129, 215, 267, 274, 315, 320, 400, 419, 449
Belgian Rails, 80
Belgian State Railways, Trial of the Heberlein Brake on the, 224
Belgium, Coal Mining in, 340
Belgium, Rolling Stock in, 136
Belgium and South America, 220
Bengal Railway, Northern, Estimates for the, 182
Berkeley and Gloucester Canal Company, The, 257, 405
Bessemer Iron on the Tyne, 340
Bessemer Steel Blowing at Dronfield, A Feat in 83
Bessemer Steel Rails, for the Belgian State Railways, 80
Bessemer Swinging Saloon Ship, The New, 449
Beyrout Water Works, Commencement of, 143
Black Diamonds, 279
Blast Furnaces, Scotch, The Number of, 194
Blochairn Iron Company, The, 469
Blochairn Iron Works, Alterations at, 487
Block and Interlocking Systems, Extensions of, in Scotland, 427
Blyth and Tyne, and North-Eastern Railway Companies, Amalgamation of the, 405
Blythe's Method of Preserving Timber, 469
Boiler Testing in the United States, 462
Boring for Coal at Auchterarder, 165
Boston, America, The Water Supply of, 197
Boston, The Rebuilding of, 351
Boulogne Harbour and the French Government, 142
Brake, Westinghouse Continuous, Extensive Use of the, 237
Brakes, Railway, Contract for, in Belgium, 340
Brazil, The Full System of Railways in, 187

Brazil, Gas in, 187
Brazilian Agate, 449
Brazilian Railway Progress, 25, 340, 449
Brazilian Telegraphy, Progress of, 25, 45, 434
Breakwater for St. John's Harbour, Canada, 25
Breakwater, The South, Aberdeen, Completion of, 279
Brecon, The Drainage of, 207
Brewery, Edinburgh, Extensive Fire at, 71
Bridesburg Arsenal, America, The Extent of, 136
Bridge, Another Mississippi, 92
Bridge, The Buffalo, across the River Niagara, Progress of, 262
Bridge Building, American, 15
Bridge for Egypt, A, 182
Bridge, Great, over the Monongahela, at Port Perry, Pennsylvania, 280
Bridge, The International, 482
Bridge, The Kerakeni, 267
Bridge over the Missouri, A Great, 145
Bridge, New, at Bigger, Scotland, 249
Bridge over the Red River, Canada, 215
Bridge, The St. Louis, Progress of, 246, 512
Bridges, Great American, 45, 129, 183, 187
Bridges, Indian Railway, 15, 219
Bridgework, Hydraulic Rivetting for, 236
Brisbane Bridge, Queensland, 358
Brisbane River, Queensland, Dredging Operations on the, 298
Bristol Channel Shipwrights, 482
Bristol, Coal in the Neighbourhood of, 405
Bristol Docks, Progress of the, 83
Bristol and Exeter Railway, Locomotives on the, 279
Bristol and Exeter Railway, Progress of the, 142, 303, 441
Bristol General Station, The Tender for, 387
Bristol Joint Station, 279
Bristol Miners' Conference, Termination of the, 345
Bristol and North Somerset Railway, Progress of the, 15, 44, 183
Bristol, Railway Warehouses at, 497
Bristol Tramways, Progress of, 100
Britannia Iron Works, Middlesbrough, Recommencement of Work at the, 83
British Association, Proposed Meeting of the, in Glasgow, 215
British Columbia, Coal in, 506
British Columbia, Ironstone in, 460
British Columbian Gold, 420
British Exhibitors at Vienna, Testimonial to Mr. P. C. Owen by, 300
British North-American Coast Survey, 25
Briton Ferry Dock, Preamble of a Bill for the Transference of, 28
Briton Ferry Iron Works, Progress at, 234, 405
Brooklyn Bridge, New York, Progress of the, 500
Brora Coalfield, Coal from the, 427
Bryncae Colliery, The, 369
Buckie, New Harbour at, 427
Buenos Ayres, Mr. Bateman at, 187, 434
Buffalo Bridge, across the River Niagara, Progress of the, 262, 460
Buildings, New Public, in the United States, 187
Buildings in Sydney, Nova Scotia, Great Increase of, 215
Burntisland Dock Works, Contemplated Alterations at, 503
Bursting of an Air-compressing Chamber, 520
Bute Hematite Mines, 28

Cable, A New Pacific, 236
Cable, Telegraph, in Connexion with the Tay Bridge, 405
Caithness Railway, Progress of the, 303
Caledonian Railway Company's Half-yearly Report, The, 249
Cambrian Railway, Expenditure of the, 165
Cammell and Company's New Collieries, near Barnsley, 468
Canada, Rolling Stock in, 257
Canada, Southern Railway, Progress of, 376
Canadian Coal, 72
Canadian Ironstone, 142, 379
Canadian Lighthouses, 25, 63, 257, 274, 306
Canadian Pacific Railway, Progress of the, 25, 100
Canadian Railways, Progress of, 122, 194, 293, 338, 379, 376, 492, 504
Canadian Steam Dredge, Built at Toronto, 111
Canadian Steam Shipping, 292
Canal Company, The Berkeley and Gloucester, 405
Canal, The Fort St. Philip, 83
Canal, The Isthmus of Corinth, 143
Canal Project, Another Great, 102
Canal, Proposed, through the Isthmus of Corinth, 71
Canal, Proposed Ship, to Combwitch, 44
Canal, Sault Sainte Marie, Improvements in the 164
Canal, The Suez, Progress of, 4, 33, 114, 124, 259, 280, 340, 433, 449, 500
Canals, Egyptian, The Number of, 121
Canterbury, New Zealand, The Discovery of Coal in, 379
Canterbury, New Zealand, Public Works in, 110
Canterbury, New Zealand, Receipts of Railways in, 83
Cape Breton Coal, The Demand for, 258
Capital and Labour in South Wales, 207, 234
Capital in South Wales, 165
Captain Boxer's Proposed Improvements for Quebec Harbour, 25
Captain Howell's Plan for an American Ship Canal, 174
Cardiff Chamber of Commerce, Special Meeting of, 15
Cardiff, Dock Accommodation at, 15, 28, 257, 303, 315, 345
Cardiff, Large Arrival of Manganese Ore at, 44
Cardiff and Penarth, Meeting to Procure Railway Communication, 469
Catalogue, New, of Ransome's Wood-working Machinery, 43
Cement, The Prideaux Patent, 345
Central Argentine Railway, Returns of the, 469
Central Asian Railway, The Projected, 71, 322
Central Pacific Railroad, Progress of the, 114, 215, 220, 224
Ceylon Canal, The Proposed, 323
Chairmanship, The, of the Gloucester and Forest of Dean Railway, 124
Charcoal and Peat Coal Company, Prospectus of the, 174
Chassepôts for the German Army, 145
Chemical Works Company, Newcastle, The, 271
Chesapeake and Delaware Canal, Re-Opening of the, 317
Chicago Hotel, Cost of a, 27
Chicago Industrial Exhibition, The, 45, 142, 346
Chicago Industries, 469
Chicago and North-Western Railway, Locomotives on the, 400
Chicago and North-Western Railway, Working Expenses on the, 420
China, Important Appointment in, 79
Chinese, Telegraph for the, 316
Chippenham Water Supply, 44
Chippenham Water Works, Commencement of the, 469
Circular of the Society for the Promotion of Scientific Industry, Manchester, 278
Ciudad Real and Badajoz Railway, The, 110
Civil Engineering Service, The Indian, 79
Civil, Engineers, The Institution of, 375, 405, 464
Clark County, Indiana, Discovery of Iron in, 200
Clark, Mr. W., C.E., Calcutta, Resignation of, 449
Cleveland Coal and Coke Trades, 28, 45, 71, 83, 111, 124, 143, 165, 183, 207, 235, 246, 271, 303, 315, 340, 369, 427, 442, 469, 505, 520
Cleveland Engineering, 28, 45, 124, 143, 165, 207, 271, 303, 387, 405, 520
Cleveland Finished Iron Trade, The, 246, 271, 487, 505
Cleveland Iron Market, The, 28, 45, 71, 83, 111, 124, 143, 165, 183, 207, 235, 246, 271, 303, 315, 340, 369, 387, 405, 442, 468, 487, 505, 520
Cleveland Ironmasters' Association, Returns of the, 28, 111, 207, 303, 387, 487
Cleveland Iron Trade, Quarterly Meeting of the, 10
Cleveland Ironstone Miners, 71, 83, 143, 246
Cleveland Miners and their Wages, 10, 45, 207, 246, 520
Cleveland, The New Works in, 45, 111, 165, 387, 427
Cleveland Shipbuilding, 28, 45, 124, 143 165, 207, 271, 369, 387, 405, 520
Clifton Extension Railway, Progress of, 315, 520
Clyde Lighthouse Trust, 28, 345
Clyde Navigation, Proposed Improvement of the, 79
Clyde Navigation Trust, Meetings of the, 16, 182, 469
Clyde Steamers, Lengthening of, 505
Clyde-Built Dredging Machines in Guayaquil, 427
Coal, American Anthracite, Analyses of, 129
Coal in Austria, The Production of, 352
Coal Basin, The Ruhr, Production of, 187
Coal, Belgian, Imports and Exports of, 5, 187, 304, 413, 522
Coal, Boring for, at Auchterarder, 165
Coal in British Columbia, 506
Coal, Canadian, 72
Coal Carried by the Ciudad Real and Badajoz Railway, 110
Coal Cars for the Intercolonial Railway, 136
Coal and Coke Trades, The Cleveland, 28, 45, 71, 83, 111, 124, 143, 165, 183, 207, 235, 246, 271, 303, 315, 340, 369, 427, 442, 469, 505
Coal-Cutting by Machinery, 387
Coal-Cutting Machines, The Manufacture of, in Scotland, 71
Coal Depôt on Staten Island, 110
Coal, Discovery of, near Bridgend, 405
Coal at Dunning, 427
Coal-Economising Gas Company, The, 427
Coal, English, in France, 80, 215
Coal Exchange, Proposed, for South and West Yorkshire, 129
Coal in France, 271, 346, 469
Coal in Greece, Discoveries of, 45
Coal, The Heating Power of, 449
Coal and Iron, American, Investments by English Capitalists in, 215
Coal and Iron, Virginian, The Development of, 326
Coal Mines, Sarrebrück, Produce of the, 174
Coal Mining in Belgium, 340
Coal Mining, German, 361, 495
Coal Mining in a Town Street, 379
Coal at Nailsea, 28
Coal in the Neighbourhood of Bristol, 405
Coal in New South Wales, 218, 220, 533, 491, 493
Coal, New Zealand, 187, 379
Coal, Nova Scotian, 45, 419
Coal in Ontario, Discovery of, 114
Coal in the Pas-de-Calais, 293
Coal, Pennsylvanian, 25, 370
Coal Pits, New, near Glasgow, 45
Coal, The Price of, at Sheffield, 15,187, 279, 369, 404, 468
Coal Question, Conference on the, at Barnsley, 235
Coal in Sarawak, 400
Coal, Somersetshire, Rise in the Price of, 207
Coal at Sydney, New South Wales, 420
Coal in Tasmania, The Discovery of, 215
Coal, Tasmanian, Company for the Working of, 400
Coal, The Tonnage of, by Rail from Sheffield to London, 45
Coal Trade, The Belgian, 5, 92, 187, 304, 315, 394, 413, 420, 506
Coal Trade, The Forest of Dean, 207, 441, 497
Coal Trade, The French, 92, 215, 328, 472, 500
Coal Trade, The, at Newcastle, New South Wales, 218
Coal Trade, The Scotch, 183, 235, 279, 427, 469
Coal Trade, The, of South Durham, 427
Coal Trade, The South Wales, 303, 405
Coal Traffic on the Northern of France Railway, 134
Coal Traffic, South Yorkshire, 129, 225, 323, 404, 505
Coal in the United States, 506
Coal in Victoria, 71, 454
Coal, Virginian, 224
Coalfield, A New, in the Hamilton District, 405
Coalfield, A New, near Wakefield, 143
Coalfields, The Alleghany, Extent of, 187
Coalfields, American, The Extent of, 99
Coalfields, Victorian, Report of Mr. J. Mackenzie on the, 454
Coals from the Brora Coalfield, 427
Coast Survey, The British North American, 25
College, Working Men's, Great Ormond-street, 249
Collieries, New, near Sheffield, 235, 482
Colliers, North Wales, Demand for Advance of Wages by, 405
Colliers, The Somersetshire, 207
Colliery, The Brineese, 369
Colliery Company, New Belgian, 215
Colliery Company, New, in New South Wales, 315
Colliery Engineers, A New Society of, 520
Colliery Extensions in Scotland, 249
Colliery on Fire near Rotherham, 369
Colliery Management, South Wales, 279
Colliery, A New, Carlton, South Yorkshire, 419
Colliery Operations, Darfield Main, 468
Colliery Operations and Experiments in South Yorkshire, 206
Colliery Shaft near Sheffield, Fire in a, 279
Collingwood Harbour, Canada, Grant for the Improvement of, 215
Combination of Coalowners in South Wales, 165
Commencement of the Nelson and Foxhill Railway, New Zealand, 111
Commission, International, on the Suez Canal Dues, 259
Communication with Divers, 462
Communication with Nantes, 15
Company, The John Cockerill, Belgium, Increasing Business of the, 258
Company, Mill Dam Mining, Dividend of the, 379
Company, New Sharleston Collieries, Issue of Shares for the, 345
Company, The Swansea Shipping, 520
Company, The Western Wagon, 183
Conference on the Coal Question at Barnsley, 235
Conference of Ironworkers at Newport, 279
Conference of Miners at Bristol, Termination of, 345
Conference, The National Ironworkers' Annual, at Newport, 207
Conference, Sanitary, in the South-West District, 100
Conference in Scotland on the Mines Regulation Act, 16
Congress, Trades Union, to be held at Sheffield, Official Programme, 345
Congress at Vienna, The Patent, 79
Consett Iron Works, The, 183, 207
Constantinople, A Floating Dock for, 224
Constantinople Metropolitan Railway, A, 246
Constantinople Tramways, Progress of, 442
Constantinople, The Water Supply of, 224, 257
Construction of Wire Tramways, Improvements in the, 242
Consumption of Fuel, The Economical, 357
Continuous Brake, Westinghouse, Extensive use of the, 337
Contract for Dundee Water Works, 517
Contract for the Northern Colonisation Railway of Canada, 122, 164, 509
Contract for Railway Brakes in Belgium, 340
Contract for Widening the New North Bridge at Edinburgh, 387
Contracts for New Railway Stations, 142
Contracts for Railways in Canterbury, New Zealand, 224
Contracts for Transatlantic Steam Navigation, 227
Contracts, Turkish, 103, 163
Conversion of Gauge on the South Wales Union Railway, 124
Cook, R., and Company, Hathernage Works, near Sheffield, Prospectus of, 187
Co-operative Coal Mine, A, near Wakefield, 442
Co-operative Iron Works at Middlesbrough, 71
Copper in Queensland, 356
Corporation of Swansea, Grant by the, for Tramways, 369
Corporation Water Works, Glasgow, Progress of the, 45, 387
Cost of Bridges for Indian Railways, 219
Cotton Manufacture, American, 110
Cowen, Sir Joseph, M.P., Death of, 520
Creusót Works, Progress of the, 460, 500, 529
Crimea, German Officers in the, 164
Culm Valley Light Railway, Progress of, 165
Cumberland, Industrial Progress in, 387
Cunard Liners, The Construction of, on the Clyde, 235
Cushioned Steel Springs, Thomson's, 10
Cwmdu Board of Health and Overcrowding in South Wales, 345
Cyfarthfa Iron Works, Negotiations for the Sale of the, 207, 235

Danks's Puddler, Granulated Iron for the, 36
Danks's Puddling Furnace at Middlesbrough, 124, 246, 340
Darfield Main Colliery, Reopening of the, 129, 468
Darlington Iron Company, Dividend of the, 83
Death of Sir Joseph Cowen, M.P., 520
Death of Mr. C. W. Eborall, 512
Death of W. J. Forrest, 315
Death of Mr. Robert Jackson, 63
Death of Mr. J. R. M'Clean, M.P., 41
Death of John MacCunn, 206
Death of Mr. C. Fease, 28
Death of Mr. J. B. Pease, 28
Death of a Well-known Greenock Shipowner, 206
Delaware and Chesapeake Canal, Reopening of the, 317
Demerara Railway, Committee Appointed to Report upon, 23
Demonstration of Cleveland Ironstone Miners at Normanby, 71
Demonstration of the Merthyr and Dowlais Miners, 100
Demonstration of Miners at Barnsley, 111
Demonstration of South Yorkshire Miners, 15
Demonstration of Welsh Colliers and Miners, 142
Devon and Somerset Railway, Opening of the, from Barnstaple to Taunton, 387
Diamonds, Black, 279
Differences between Glasgow and Greenock on Clyde Navigation Improvements, 345
Diplomas of Honour at the Vienna Exhibition, 161
Discharge Note System, Practical Illustration of the, 345
Discovery of Coal near Bridgend, 405
Discovery of Coal in Ontario, 114
Dispute, The, with Earl Fitzwilliam's Colliers, 15
Dispute in the Engineering Trades of Sheffield and Leeds, Meeting of the Men on Strike, 187
Dispute in the Glasgow Coal Trade on the Special Rules, 45, 71, 111
Divers, Communication with, 462
Dividend of the Creusót Company, 500
Dividend of the Great Western Coal Company, Rhondda Valley, 279
Dividend of the Mill Dam Mining Company, 379
Dividend of the Monmouthshire Railway Company, 165
Dividends of South Yorkshire Companies, 111, 143, 187
Dock Accommodation at Cardiff, 15, 28, 257, 303 315, 345
Dock Accommodation at Swansea, 207, 313
Dock, The Briton Ferry, and the Great Western Railway Company, 28
Dock, Floating, for Constantinople, 224
Dock, New, at Berwick, 79
Dock, New Graving, at Port Glasgow, Progress of the, 215
Dock, Opening of a New, at West Wemyss, Fifeshire, 249
Dock, Proposed, at Stockton, 10, 369
Docks, Avonmouth, Progress of the, 28, 257
Docks, Bristol, Progress of the, 83
Double-Bogie Carriage for the Festiniog Railway, 353
Drainage of Brecon, State of the, 207
Drainage, The Metropolitan Main, 75
Dreadful Calamity at the Tay Bridge Works, 165
Dredger, A New Steam, for Calcutta, 142
Dredging Machines, Clyde-Built, in Guayaquil, 427
Dredging Operations on the Brisbane River, Queensland, 298
Drighlington, Mining Operations at, 442, 482
Dry Dock Accommodation at Newport, 183
Drybrook Iron Ore Company, The, 257
Dundee Harbour Works, Progress of the, 28, 111
Dundee, New Water Works for, 235
Dundee Water Works Contract, 505, 517
Dunedin and Port Chalmers Railway, Additions to the, 292
Dunning, Coal-Boring Operations at, 427
Duplex Telegraph, The, 223
Dutch Steam Navigation, 15
Dynamite, Experiments with, in Monmouthshire, 441
Dynamite, Experiments with, at Wakefield, 235

Earl Fitzwilliam's Colliers, The Dispute with, 15
Eastern of France Railway, Rolling Stock of the, 25
Eastern Telegraphy, 71, 265, 274
Eborall, Mr. C. W., Death of, 512
Ebbw Vale Iron Works, Presentation to the Manager of, 345
Economical Consumption of Fuel, 357
Economy of Fuel, 278
Edinburgh Chamber of Commerce, The, on the Ceylon Canal, 323
Edinburgh and Glasgow, The Scientific Societies of, 405
Edinburgh and Leith Engineers' Society, Meeting of the, 345, 405, 449
Edinburgh, Mining Operations near, 369
Edinburgh Museum of Science and Art, 405
Edinburgh Water Works, Progress of the, 71
Egypt, Contract for Railways in, 219
Egypt, Iron Bridge for, 182
Egyptian Canals, The Number of, 121
Egyptian Railways and Telegraphs, 187
Eight-Hours Movement, Proposed, in the North of England, 442
Elevator, Grain, at the Smithfield Club Show, 510
Embikement and Drainage of the Wieringer Lake, Holland, The Cost of, 257
Engine, Floating Steam Fire, for Glasgow Harbour, 279
Engineer's Promotion, An, 287
Engineering, Cleveland, 28, 45, 124, 143, 165, 207, 271, 369, 387, 405
Engineering, Projects and Facts in, 404
Engineering in South Yorkshire, 23, 63, 82, 111, 165, 214, 249, 279, 323, 345, 404, 442
Engineers, Lancashire, Lock-out of, 121
Engineers, Meeting of the Midland Institute of, 214
Engineers, Sheffield, Strike of, 15, 23, 45, 85, 111, 129, 165, 187, 279, 303, 505
Engineers and Shipbuilders in Scotland, Meeting of the Institution of, 369
Engines, Narrow Gauge, for the Grand Trunk Railway of Canada, 352
English Coal in France, 80, 215
Entrance Lock for Bristol Docks, Opening of a New, 83
Equipment Company, The, Canada, 257
Erimus Iron Works, The, Middlesbrough, 83, 235, 246
Estimated Cost of the Roundhay Park Railway, 349
Estimated Cost of the Isthmus of Corinth Canal, 506
Estimates for the Improvement of Alloa Harbour, 28
Europe, The Navies of, 500
Examination of Yorkshire Colliery Managers, 520
Examinations, Technological, of the Society of Arts, 182
Exeter and Bristol Railway, Progress of the, 142, 303, 441
Exhibition, The American International, of 1876, 437
Exhibition of Appliances for the Economic Consumption of Fuel, 482
Exhibition, A Chicago, 45, 346
Expenditure of the Cambrian Railway, 165
Expenditure and Receipts of the Bristol and Exeter Railway, 142
Expenses and Receipts of the Roman Railway, 206

Expenses, Working, on the San Paulo Railway, 400
Experiments and Colliery Operations in South Yorkshire, 303
Experiments with Dynamite in Monmouthshire, 441
Experiments with Dynamite at Wakefield, 235
Explorations at the Oaks Pit, 320
Exports of American Locomotives, 415, 420
Exports of Belgian Iron, 300
Extensions, Colliery, in Scotland, 249
Extension of the Interlocking and Block Systems in Scotland, 427
Extensive Mineral Lease in Renfrewshire, 79
Eyam Mining Company, Meeting of the, 468

Facilities, Railway, 405, 469
Fairbank's Scales, United States, Increased Manufacture of, 469
Fairfield Association, Meeting of the, 469, 517
Falmouth Dock, Half-Yearly Report of the, 83
Fast Steam Launches, 71
Feat in Bessemer Steel Blowing at Dronfield, A, 83
Fell System of Railway, The, in Brazil, 187
Ferries, The New York, 111
Ferry, Steam, at Middlesbrough, The Commencement of, 405
Festiniog Railway, Double-Bogie Carriage for the, 393
Fifth Transatlantic Cable, The, 224
File Cutters and Forgers' Agitation at Sheffield, The, 83
Finished Iron Trade, The Cleveland, 246, 271, 487, 505
Finished Iron Trade, The Glasgow, 45, 79, 323
Fire at a Colliery near Rotherham, 369
Fire in a Colliery Shaft near Sheffield, 279
Fire, Extensive, at the Park Brewery, Edinburgh, 71
Firemen, Meeting of, in the Rhondda Valley, 28
First American Locomotive, The, 474
Fleming, Mr. Sandford, Accident to, 45
Floating Dock, A, for Constantinople, 224
Floating Steam Fire Engine for Glasgow Harbour, 279
Foreign Measures and English Equivalents, 149
Foreign Mechanical Industry, 306
Foreign Rolling Stock, 224
Foremen Engineers and Draughtsmen, London Association of, 22, 72, 100, 291, 491
Forest of Dean Coal Trade, The, 207, 441, 497
Forest of Dean Colliers, Lock Out of, 257
Forest of Dean, Labour in the, 134, 257
Formation of the Lenchars New Line of Railway, Tay Bridge, 405
Forrest, W. J., Death of, 315
Fort St. Philip Canal, The, 83
Forth and Tay Bridges, Progress of the, 469
Forts at Strasburg, Official Visit to, 410
Foundry Trade, The Glasgow, 45
Fowler, Mr. C., on the Cost of the Roundhay Park Railway, 369
France, Coal in, 346
France, German Coal in, 227
France, The Importation of Coal into, 271
France, Increased Production of Coal in, 469
France, Iron Minerals in, 274
French Association for the Advancement of Science, The, 96
French Coal Trade, The, 92, 215, 328, 472, 500
French General Water Supply Company, 292
French Iron Trade, The, 24, 110, 182, 274, 292, 346, 376
French Rails for Alsace and Lorraine, 25
French Railway Plant Company, Value of Work Executed by the, 25
French Railway Progress, 497
Fuel, The Economical Consumption of, 357
Fuel, Economy of, 278
Fuel, Exhibition of Appliances for the Economical Consumption of, 443
Fuel Works, Patent, at Bathgate, 235
Furnace, The Danks, at Middlesbrough, 246
Furnace, The Danks, in the North of England, 349

Galata and Pera Railway, Stoppage of Works on the, 349
Galleries, Snow, on the Central Pacific Railroad, 220
Garvel Park Graving Dock, Lengthening of Vessels in, 469
Gas in Auckland, New Zealand, 420
Gas in Brazil, 187
Gas Company, The Coal-Economising, 427
Gas Consumers' Strike at Taunton, 279
Gas Consumers, Welcome to, 520
Gas Enterprise, Belgian, 376
Gas in Paris, Revenue derived from, 280
Gas, Serious Escape of, at Sheffield, 379
Gas in South Australia, 345
Gas in Stamboul, 54
Gas Stock of the Bristol United Gaslight Company, Sale of, 469
Gauge Question, The, in the United States, 400
General Station, Bristol, The Tender for, 387
Geological Surveys in Colorado, 164
German Army, Chassepots for the, 143
German Artillery, 176
German Coal in France, 227
German Coal Mining, 361, 495
German Mail Steamer, A New, 505
German Military Railway Traffic, 96
German Navy, Progress of the, 152
German Officers in the Crimea, 164
Gift, Munificent, of the Messrs. Pease, at Middlesbrough, 235
Glidersome, South Yorkshire, Mining Operations at, 279
Glasgow Association of Engineering and Shipbuilding Draughtsmen, Meeting of the, 405, 449
Glasgow Corporation Water Committee, Report on Water-Closets by the, 215
Glasgow Corporation Water Works, 45, 387
Glasgow Finished Iron Trade, The, 45, 79, 323
Glasgow Foundry Trade, The, 45
Glasgow and Greenock, Differences between, on Clyde Navigation Improvements, 345
Glasgow Harbour Works, Progress of the, 111, 124
Glasgow Locomotive Trade, The, 308
Glasgow Malleable Iron Trade, The, 111, 165, 183, 215, 249, 345
Glasgow Manufactured Iron Trade, 142, 235, 279, 469
Glasgow, New Barracks for, 215, 279
Glasgow Pig Iron Market, 16, 28, 45, 71, 79, 111, 124, 142, 165, 183, 215, 235, 249, 279, 303, 323, 345, 369, 387, 405, 427, 449, 469, 487, 505
Glasgow, The Sewage Difficulty in, 215
Glasgow, Shipbuilding at, 28
Glasgow University Department of Engineering, 369
Glenelg and Adelaide Railway, Trial Trip with Horses on the, 187
Gloucester and Berkeley Canal Company, The, 257, 405
Gloucester and Forest of Dean Railway, The, 124
Goderich Harbour, Canada, Plans for, 280
Gold, British Columbian, 420
Gold Coined at the Melbourne Mint, The Quantity of, 215
Gold and Silver Mines, Discovery of, near Mexico, 187
Goods Traffic on the San Paulo Railway, 354
Government Prosecution for Infringement of the Mines Regulation Act in South Wales, 279
Grain Elevator at the Smithfield Club Show, 510
Grand Pacific Hotel at Chicago, Estimated Cost of, 27
Grand Trunk Railway of Canada, Progress of the, 14, 122, 239, 352, 370
Grangetown Iron Works, The Proposed Sale of, 345
Grantham's Steam Tram Car, Experiments with, 449
Granulated Iron for the Danks Puddler, 36
Graving Dock, Alfred, Victoria, Progress of, 292
Graving Dock at Port Glasgow, Progress of the, 215
Graving Dock, Proposed, for Quebec Harbour, 420
Great Bridge over the Monongahela at Port Perry, Pennsylvania, 280
Great Bridges, More American, 45, 129, 187
Great Canal Project, Another, from the Black Sea, 103
Great Gale, The, in South Yorkshire, 505
Great Russian Railway, Guaranteed Interest for the, 25
Great Ship Canal, Another American, 348
Great Southern Railway, New South Wales, Extension of the, 229
Great Southern Railway of New South Wales, Tenders for the, 215
Great Western Railway of Canada, Progress of, 83, 194, 361
Great Western Railway, Contemplated Application to Parliament, 482
Great Western Railway, Expenditure for Locking Junctions, Points, and Signals, 235
Great Western Railway, Improvements on the, 307
Great Western Railway, Locomotives on the, 183
Greece, Discovery of Coal in, 45
Greece and Turkey, New Line of Telegraph between, 265
Greek Tramways, Application for a Concession for, 315
Greenock Corporation Water Supply, Reduction of Assessment, 235
Greenock Gas Works, Progress of, 505
Greenock and Port Glasgow Gas Works, Progress of, 323
Greenock, Proposed River Improvements near, 369
Grey, Toronto, and Bruce Railway, Progress of, 25, 194, 301, 426, 489
Gunboats, Turkish, 45
Gunpowder Shipments from the Clyde, 505

Half-Yearly Accounts of the Swansea Vale Railway, 165
Half-Yearly Report of the Caledonian Railway Company, 249
Half-Yearly Report of the Monmouthshire Railway and Canal Company, 257
Half-Yearly Report of the North British Railway Company, 249
Halifax Iron Lightship, The, 257
Halliday, Mr., at Rhymney, 234
Hannay and Sons v. Tannett, Walker, and Company, Ironworkers, 323
Harbour, Boulogne, and the French Government, 143
Harbour, Collingwood, Canada, Grant for the Improvement of, 215
Harbour Improvements, Quebec, 187
Harbour, New, at Buckie, 427
Harbour, Port Glasgow, The Proposed Purchase of, 124
Harbour at Poti, Site chosen for the, 71
Harbour, Quebec, Proposed Graving Dock for, 420
Harbour Works, Aberdeen, Progress of the, 28, 79, 111, 279
Harbour Works, Anstruther, Progress of the, 28
Harbour Works, Ayr, Progress of the, 111
Harbour Works, Dundee, Progress of the, 28, 111
Harbour Works, Glasgow, Progress of the, 111, 124
Hawkshaw, Sir John, Report of, to the Greenock Harbour Trustees, 249
Head-Quarters of the Ironworkers' Association, The, 387
Heating Power of Coal, 449
Heberlein Brake, Trial of the, 224
Heights of North American Mountains, 196
Helston and the Lizard, Telegraphic between, 83
Hematite Mines, Bute, 28
Highland Agricultural Society of Scotland, The, 16
Hobson's Bay and Melbourne Railway, Official Inspection of the, 370
Holkar State Railway, Progress of the, 215
Holland Battling with the Ocean, 529
Holland, Reclamation Works in, 257
Hoosac Tunnel, Progress of the, 25, 71, 265, 273, 294
Huddersfield Water Supply, Augmentation of the, 369
Hydraulic Rivetting for Bridgework, 236

Ilfracombe and Barnstaple Railway, Progress of the, 142
Illinois Central Railroad, Progress of the, 4
Imperial Ton, Meeting for the Adoption of the, 100
Important Appointment in China, 79
Imports of Coal into Belgium, 5
Improvement of Alloa Harbour, Estimates for, 28
Improvement in the Construction of Wire Tramways, 243
Improvement of the Clyde Navigation, Proposed, 79
Improvement of Port Jackson, New South Wales, 469
Improvement of the River Tees, 163
Improvements of Aberdeen Harbour, 79
Improvements and Additions to Works at Sheffield, 249, 345
Improvements, Commencement of, in Port Talbot Harbour, 274
Improvements on the Great Western Railway, 307
Improvements in Traffic at Birkenhead, 510
Improvements at Truro, 520
Improvements on the Tyne, 28
Increase of the South Welsh Coal Traffic to London, 405
Increase of Wages, Another Demand for, by the Pitmen of Durham, 308, 387
Increased Railway Facilities in the South-West, 405
Indian Civil Engineering Service, The, 79
Indian Railway Bridges, The Cost of, 219
Indian Railways, The Shipment of Materiel for, 215
Indian Steam Navigation, 142
Indiana, Discovery of Iron in, 200
Industrial Exhibition, The Chicago, 142
Industrial Progress in Cumberland, 387
Industries, Chicago, 469
Industry, Foreign Mechanical, 306
Inspection of Steamers in New Zealand, 405
Institute of Mining Engineers, The Midland, 482
Institution of Civil Engineers, The, 375, 405, 464
Institution of Engineers and Shipbuilders in Scotland, Meetings of the, 369, 449
Intercolonial Railway, Coal Cars for the, 136
Intercolonial Railway, Progress of the, 14, 122, 469
Interlocking and Block Systems, Extension of, in Scotland, 427
International Bridge, The, 482
International Bridge, The Buffalo, across the River Niagara, Progress of the, 262, 400
International Commission on the Suez Canal Dues, 259
International Concours at Versailles, 129
International Exhibition, 1874, The London, 487, 497, 510, 513
International Patent Congress at Vienna, 6, 79, 143
Iron in Alabama, 187
Iron in Belgium, The Exports and Imports of, 300, 419
Iron, Bessemer, on the Tyne, 340
Iron Bridge for Egypt, 162
Iron and Coal Company, The Sheepbridge, Annual Meeting of, 214
Iron and Coal Company, The Tredegar, 15
Iron Company, The Blochairn, 469
Iron Company, The Darlington, Dividend of the, 83
Iron Company, The Rhymney, and Cardiff County Court, 44
Iron, Granulated, for the Danks Puddler, 36
Iron in Indiana, Discovery of, 200
Iron Lightship, The Halifax, 257
Iron in Lincolnshire, 259
Iron Market, The Cleveland, 28, 45, 71, 83, 111, 124, 143, 165, 183, 207, 235, 246, 271, 303, 315, 340, 369, 387, 405, 442, 466, 487, 505
Iron Minerals in France, 274, 400
Iron Ore from Algeria, 505
Iron Ore at Baltimore, Discovery of, 110
Iron Ore Company, The Derbrook, 257
Iron Ore Company, The Wigpool, 257
Iron Ore, Magnetic, in the Island of Bute, 517
Iron Ore, Tasmanian, 71
Iron in Oregon, Large Discovery of, 83
Iron in Rhode Island, 426
Iron and Steel Institute, The, 71, 111
Iron and Steel Works, Proposed Erection of, in the Swansea District, 303
Iron Trade, The Belgian, 45, 83, 129, 215, 267, 274, 315, 330, 400, 419, 449
Iron Trade, The French, 24, 110, 182, 274, 292, 340, 376
Iron Trade, The Pennsylvanian, 469
Iron Trade, The, of Pittsburg, America, 198
Iron Trade, Prospect of the, 235
Iron Trade, The Welsh, 124
Iron in Victoria, New Discovery of, 265
Iron Works, The Beaufort, Stoppage of, 405
Iron Works, The Britannia, at Middlesbrough, 83
Iron Works, Briton Ferry, Progress of the, 234, 405
Iron Works, The Consett, 183, 207
Iron Works, Co-operative, at Middlesbrough, 71
Iron Works, Cyfarthfa, Negotiations for the Sale of the, 207, 235
Iron Works, The Erimus, Middlesbrough, 83, 235, 246
Iron Works, The Grangetown, Proposed Sale of, 345
Iron Works in the North of England, 183
Iron Works, The Summerlee, and the Proposed Limited Liability Company, 345
Ironclad, Turkish, Completion of a, 174
Ironclads, Spanish, The Number of, 361
Ironclads, Turkish, The Number of, 71
Ironmasters' Association, Cleveland, Returns of the, 28, 111, 207, 303, 387, 487
Ironmoulders, Strike of, at Middlesbrough, 165
Ironstone in British Columbia, 400
Ironstone, Canadian, 143, 379
Ironstone Mines, The Cleveland, 71, 83, 143, 246
Ironstone Miners, The Cleveland, and Mr. Kettle's Award, 45
Ironstone, Recent Discoveries of, in Tasmania, 45
Ironworkers' Association, Head-Quarters of the, 387
Ironworkers' Conference at Newport, 279
Ironworkers and their Wages in the North of England, 466
Irrigation in the United States, 427
Isthmus of Corinth Canal, The Estimated Cost of, 306
Isthmus of Corinth, Proposed Canal through the, 71, 143
Italian Defences, Parliamentary Commission on the, 41
Items, Miscellaneous, South Yorkshire, 45, 214, 249, 279, 323, 345, 419

Jackson, Mr. Robert, Death of, 83
Japan, Telegraph from, to America, 272
John Cockerill Company, Belgium, Increasing Business of the, 368
Joint Station, Bristol, 279
Juniata, American Steamer, Sailing of the, for the Arctic Regions, 113
Juvenile Labour at Aberdare, 28

Kansas Pacific Railway, The, 25
Karakeui Bridge, The, 367
Kehl Bridge, Reconstruction of the, 273
Kilsyth, near Glasgow, New Railway at, 71
Krupp of Essen and the Turkish Government, 163
Krupp in the United States, 469

Labour in the Forest of Dean, 134, 257
Labour, Juvenile, Prosecution for the Employment of, at Aberdare, 28
Labour in South Wales, 15, 28, 207, 234, 469
Landore Steel Works, 407, 482
Launch, An American Steam, Built at San Francisco, 132
Launch of the Largest Sailing Ship ever Built on the Clyde, 345
Launch at Pembroke Dock, 387
Launches, Fast Steam, 71
Launches on the River Clyde, 111
Lectures on Applied Mechanics and Marine Engineering in Scotland, 323
Leeds New Bridge, Opening of the, 45
Leeds Water Works, The, 63
Legislative Assembly of New South Wales on Telegraphy, 25
Leith and Edinburgh Engineers' Society, Meeting of the, 345, 405, 449
Length of the Yellowstone River, America, 136
Lengthening of Clyde Steamers, 505
Lengthening of Vessels in Garvel Park Graving Dock, 469
Lenchars New Line of Railway, Tay Bridge, Formation of the, 405
Light Draught Steamers, 525
Light Railway, The Culm Valley, Progress of, 165
Lighthouse, Queensland, Commencement of a New, 367
Lighthouse Service, The Northern, 215, 387
Lighthouse Trust, The Clyde, 28, 345
Lighthouse, Turnberry, Ayrshire, First Lighting of the, 315
Lighthouses, Canadian, 25, 63, 257, 274, 309
Lightship, Iron, The Halifax, 257
Lightship, Proposed, for the Miramichi River, 28
Lincolnshire, Iron in, 259
Linlithgow, The Water Works at, 469
Liverpool and Manchester Agricultural Society, Annual Show of the, 237
Liverpool and the Southern States of America, 225
Local Board of Mirfield, Meeting of the, 323
Local Companies, New, in South Yorkshire, 63
Locking Junctions, Points, and Signals, Expenditure of the Great Western Railway Company upon, 235
Lock-Out of Forest of Dean Colliers, 257
Lock-Out of Lancashire Engineers, 121
Locomotive, A Queensland, the First Constructed, 420
Locomotive Service for the Kansas Pacific Railway, The Cost of, 25
Locomotive Trade, The, in Glasgow, 303
Locomotive Works, Philadelphia, The Baldwin, Progress of, 194, 315, 376, 430, 469, 495
Locomotives, American, Decrease in the Manufacture of, 315
Locomotives, American, Exports of, 415, 420
Locomotives on the Bristol and Exeter Railway, 279
Locomotives on the Chicago and North-Western Railway, 400
Locomotives on the Great Western Railway, 183
Locomotives in Turkey, 265
London Association of Foremen Engineers and Draughtsmen, 22, 72, 100, 291, 491
London and County Banking Company, Meeting of the, 110
London International Exhibition, 1874, 487, 497, 510, 513
London and North-Western Railway, The, in Wales, 207, 303
London Water Companies, Report of Mr. F. Bolton on the, 349
Lords of the Admiralty, The, and Pembroke Dock Officials, 165
Louth and East Coast Railway, Prospectus of the, 442
Low Stubbin Colliery, Termination of the Strike at, 45
Lynvi and Ogmore Railway, 126

M'Clean, Mr. J. R., Death of, 41
MacCunn, John, Death of, 208
Machinery, Coal-Cutting by, 387
Machinery for the Soudan, 94
Machinery, Wheat-Cleaning, Prizes Offered for, in Australia, 420
Machines, Coal-Cutting, The Manufacture of, in Scotland, 71
Mackinaw, The Strait of, Attempts to Lay a Cable across, 196
Madras and Tanjore Railway, Commencement of the, 449
Maesteg Merthyr Steam Coal Company, Late Oakwood Colliories, The Sale of, 362
Maesteg, Testimonial to Mr. Colquhoun on his Departure from, 83
Magnetic Iron Ore in the Island of Bute, 517
Mail Service, The American, 420
Mail Service, The Australian, 126

Mail Service, The San Francisco, 419
Malleable Iron Trade, The Glasgow, 111, 165, 183, 215, 249, 345
Manchester and Liverpool Agricultural Society, Annual Show of the, 227
Manganese Ore, Large Arrival of at Cardiff, 44
Mann's Railway Sleeping Carriage Company, 39
Manufacture of Spiegeleisen at Sheffield, 167
Manufactured Iron Trade, The Glasgow, 142, 235, 279, 469
Marine Engineering and Applied Mechanics, Lectures on, in Scotland, 323
Maryborough and Ballarat Railway, Victoria, Progress of the, 449
Mass Meeting of the Rhymney Valley Colliers, 134
Mass Meeting of the Welsh Colliers, 88
Material for Indian Railways, The Shipment of, 215
Matters, Tasmanian, 374
Matthews, Mr. J. H. Appointed Secretary of the Bristol and Exeter Railway, 303
Mauser Rifle, The, for the German Army, 165
Measures, Foreign, and English Equivalents, 149
Measures and Weights, Russian, 393
Mechanical Industry, Foreign, 366
Medal of Merit to Messrs. Gwynne and Company, at the Vienna Exhibition, 174
Medal of Merit to Messrs. Laird, at the Vienna Exhibition, 174
Medal of Merit to Whitley Partners, at the Vienna Exhibition, 183, 238
Medal of Merit to Messrs. J. H. Wilson and Company, at the Vienna Exhibition, 238
Medal for Progress to Hayward Tyler and Company, at the Vienna Exhibition, 183
Meeting, Annual, of the Sheepbridge Iron and Coal Company, 214
Meeting, Annual, of the West of Scotland Association of Gas Managers, 16
Meeting of the Association of Engineering and Shipbuilding Draughtsmen, Scotland, 440
Meeting of the Commissioners of Dundee Water Works, 235
Meeting of the Edinburgh and Leith Engineers' Society, 345, 405, 449
Meeting of the Eyam Mining Company, 468
Meeting of the Fairfield Association, 469, 517
Meeting, Half-Yearly, of the Severn and Wye Railway Company, 469
Meeting, Half-Yearly, of the Sheffield United Gaslight Company, 345
Meeting of the Institution of Civil Engineers, 464
Meeting of the Institution of Engineers and Shipbuilders in Scotland, 348, 449
Meeting of the Leeds Water Works Committee, 63
Meeting of the London and County Banking Company, 110
Meeting of the Mirfield Local Board, 329
Meeting, Quarterly, of the Clyde Lighthouse Trust, 98
Meeting of the Society of Telegraph Engineers, 422
Meeting, Special, of the Cardiff Chamber of Commerce, 15
Melbourne and Hobson's Bay Railway, Official Inspection of the, 370
Melbourne Mint, Quantity of Gold Coined at the, 215
Melyn Tin Works, Work Resumed at, 520
Memorandum on the Whitworth Scholarships, 218
Merthyr and Dowlais Mines, 100
Merthyr Tydvil, Trade at, 441, 497
Metallurgy, Tasmanian, 45, 71, 121, 265, 310
Metropolitan Main Drainage, The, 75
Metropolitan Railway, A Constantinople, 246
Mexican Mining, 187
Michigan Central Railway, Steel Rails on the, 187
Middlesbrough, Another Railway near, 427
Middlesbrough, Messrs. Cochrane's Foundry at, 442
Middlesbrough, Progress of the Salt Pits at, 183
Midland Institute of Engineers, Meeting of the, 214, 482
Midland Railway, The, and Wales, 370
Military Railway Traffic, German, 96
Military Telegraph, An American, 290
Mill Dam Mining Company, Dividend of the, 379
Mine, A Co-Operative Coal, near Wakefield, 442
Mineral Lease, Extensive, in Renfrewshire, 79
Minerals, Algerian, The Probable Production of, 375
Minerals, American, The Discovery of, 376
Minerals, Iron, in France, 400
Minerals, New Zealand, 434
Minerals, Spanish Iron, 207
Minerals, Turkish, Discoveries of, 278
Miners' Demonstration at Barnsley, 111
Miners' Strike in New South Wales, Termination of, 25
Miners and their Wages, Cleveland, 10, 45, 207, 246
Mines, Discussion on the Regulation of, 315
Mines Regulation Act, Arbitration Meeting at Cardiff on the 28
Mines Regulation Act, Conference in Scotland on the, 16
Mines Regulation Act, The, in the South-West, 28, 44, 405
Minimising Atlantic Steaming, 165
Mining in Asia Minor, 315
Mining, Coal, in a Town Street, 379
Mining, German Coal, 361
Mining Institute, Ayrshire, Progress of the, 235
Mining, Mexican, 187
Mining Operations at Drighlington, 442, 482
Mining Operations near Edinburgh, 369
Mining Operations at Gildersome, South Yorkshire, 279
Mining Operations near Prestonpans, 427
Mint San Francisco, Progress of the, 400
Mint, The United States, 449
Minting Operations, American, 420
Minute of the Privy Council of Education on the Whitworth Scholarships, 420
Miramichi River, Proposed Lightship for the, 28
Mirfield Local Board, Meeting of the, 323
Miscellaneous Items, South Yorkshire, 45, 214, 249, 279, 323, 345, 419
Mississippi Bridge, Another, 97
Mississippi, Navigation of the, 120
Missouri, Great Bridge over the, 143
Missouri River, Turning the Channel of, 36
Monitor, The Originator of the, 512
Monitors, Turkish, The Number of, 71
Monmouth and Ross Railway, 109
Monmouthshire, Dynamite Experiments in, 441
Monmouthshire Railway and Canal Company, Half-Yearly Report of the, 267
Monmouthshire Railway, Progress of the, 165, 235, 482
Montreal Northern Colonisation Railway, Contract for the, 122, 164, 500
Montreal and Ottawa Junction Railway, Progress of the, 330
Montreal, The Port of, 91
Motherwell, Termination of the Strike at, 124
Mountain Ash, Meeting of Colliers at, 44
Mountains, North American, 196
Movement for Short Time at Sheffield, 48, 482
Movement of Troops by Railway, 183
Munificent Gift of the Messrs. Pease, at Middlesbrough, 235
Murray Railway, Australia, Deputation to the Government with Reference to the, 215
Murray River, Improvement of the Mouth of the, 415
Museum of Science and Art, Edinburgh, 405

Nailsea, Coal at, 28
Nantes, Communication with, 15
Napier Swamp, New Zealand, Proposed Reclamation of the, 294
Narrow Gauge Engines for the Grand Trunk Railway of Canada, 332
Narrow Gauge Railways, American, 25
National Defences, Italian Parliamentary Commission on the, 41
National Ironworkers' Conference, Newport, The Annual, 207
Navies of Europe, The, 500
Navigation of the Mississippi, The, 120
Navigation Trust, The Clyde, Meetings of the, 16, 183, 469
Navy, German, Progress of the, 152
Navy, Spanish, Strength of the, 361
Navy, The United States, Progress of the, 114, 215, 220, 272, 420, 504
Nelson and Foxhill Railway, New Zealand, Commencement of the, 111
Nelson, The Province of, New Zealand, 218
New Alexandra Palace, Progress of the, 462
New American Railroad Contract, 400
New Barracks for Glasgow, 215, 279
New Bessemer Swinging Saloon Ship, The, 442
New Bridge at Biggar, Scotland, 249
New Bridge at Leeds, Opening of the, 45
New Coalfield, A, in the Hamilton District 405
New Coal Pits, near Glasgow, 45
New Collieries, Cammell and Company's, near Barnsley, 468
New Collieries, near Sheffield, 235, 482
New Colliery, A, Carlton, South Yorkshire, 419
New Dock at Berwick, 79
New German Mail Steamer, A, 505
New Jersey Railroad Widening of the, 153
New Harbour at Beckie, 427
New Local Companies in South Yorkshire, 83
New Pump for the Pacha of Egypt, 505
New Railway Projects in Caithness-shire, 323
New Sharleston Collieries Company, Issue of Shares for the, 345
New Shipbuilding Yard at Glasgow, 517
New Smiths' Shops at a Colliery, 379
New Society of Colliery Engineers, A, 520
New South Wales, Coal in, 218, 220, 333, 491, 493
New South Wales, Termination of a Strike in, 25
New South Wales, Tin in, 327
New Undertakings and Extensions, Proposed, in South Yorkshire, 345, 404
New Vein of Coal, Discovery of, in Llanelly, 165
New Water Works, Bath, 83
New Water Works for Dundee, 235
New Works in Cleveland, 48, 111, 165, 387, 427
New York Docks, Appointment of Chief Engineer to the, 111
New York Ferries, The, 111
New York Parks, Extent of the, 340
New York, Progress of the Brooklyn Bridge at, 503
New York, Providence, and Boston Railroad, Progress of the, 420
New York Times, Walter Presses for the, 111
New Zealand Coal, 187, 379
New Zealand, Minerals, 434
New Zealand Railways, Progress of, 45, 83, 187, 224, 382, 452, 469, 493, 500
New Zealand Silver Ore, 313
New Zealand Surveys, 187
New Zealand, Swamp Reclamation in, 420
New Zealand Telegraphy, 23, 370, 404
Newcastle Chemical Works Company, The, 271
Newcastle, New South Wales, The Coal Trade at, 218
Newcastle-on-Tyne, Opening of the Wallsend Slipway Company's Works at, 404
Newfoundland, Surveys of for the Canadian Government, 99
Newport Alexandra Dock Company, The, 207
Newport, Conference of Ironworkers at, 279
Newport, Dry Dock Accommodation at, 183
Newport, Trade at, 100, 183, 207, 441, 520
Newport Tramways, Progress of, 165
Normanby, Middlesbrough, Demonstration of Cleveland Miners at, 71
North American Continent, Crossing the, 426
North American Mountains, 196
North Bridge, Edinburgh, Widening of the, 111, 387
North British Railway Company, Half-Yearly Report of the, 249
North British Railway, New Rolling Stock for the, 71
North-Eastern Railway of Victoria, Opening of, to Benalla, 434
North of England, Iron Works in the, 183
North of England Pitman to be Sent to Parliament, 340
North of England, The Wages Question in, 235, 271, 303, 313, 427, 468, 487, 506
North of England Wagon Company, The, 45
North Somerset and Bristol Railway, Progress of the, 15, 44, 183
North Wales Colliers, Demand for Advance of Wages by, 405
Northern Bengal Railway, Estimates for the, 132
Northern of France Railway, Coal Traffic on the, 134
Northern of France Railway, Rolling Stock on the, 123
Northern Lighthouse Service, The, 215, 387
Northern Pacific Railroad, Progress of the, 25, 110, 161, 215, 224, 375, 400, 426, 500
Northern Railway Company of Canada, Extension to Washago, 224
Northern Railway of Queensland, Progress of the, 187, 319
Notices, Parliamentary, for the Sheffield Districts, 419
Nova Scotian Coal, 45, 419
Nova Scotian Coal, The Quantity Raised and Shipped, 258
Nunnery Collieries, near Sheffield, Fire at, 279
Nussey and Pilling's Sewing Machines at the Vienna Exhibition, 174

Oak Collieries, near Barnsley, Purchase of, by Cammell and Company, 468
Oaks Colliery, Reported Transfer of the, 15
Oaks Pits, Explorations at the, 520
Oakwood Collieries, The Sale of, 369
Officers, American, in Europe, 68
Ogmore and Llynvi Railway, 134
Ohio and Baltimore Railroad, Proposed New Depôt for the, in Washington, 340
Oil Trade, The Shale, at Johnstone, 215
Opening of the Adelaide, Glenelg, and Suburban Railway, 356
Opening of the Exhibition at Chicago, 346
Opening of the International Bridge, Buffalo, 400
Opening of the Leeds New Bridge, 45
Opening of a New Dock at West Wemyss, Fifeshire, 249
Opening of the Ross and Monmouth Railway, 100
Opening of the Sheffield Tramways, 203
Opening of the Wallsend Slipway Company's Works, Newcastle-on-Tyne, 404
Ordnance, Turkish, 142, 163, 224
Oregon, Large Discovery of Iron in, 83
Originator of the Monitor, The, 512
Orkney, Proposed Railway in, 71
Ottawa and Montreal Junction Railway, Progress of the, 330
Ottawa Parliament Building, Completion of, 165
Ottawa Sewage, 392
Ottawa Water Supply, 306
Overcrowding in South Wales, 345
Owen, Mr. P. C., Testimonial to, 300
Owen's Patent Wheel-Tyre and Axle Company, Rotherham, Progress of, 249, 379

Pacific Cable, A New, 236
Pacific Mail Steamship Company, American, Yearly Receipts of the, 4
Pacific Ocean, Specimens of the Bed of the, 313
Paris, Lyons, and Mediterranean Railway Company, Rails for the, 357
Parisian Company for Lighting and Heating by Gas, Revenue of the, 280
Park Brewery, Edinburgh, Extensive Fire at the, 71
Parks, New York, Extent of the, 340
Parliament Buildings, Ottawa, Completion of, 165
Parliamentary Commission, Italian, on the National Defences, 41
Parliamentary Projects for the Sheffield District, 419
Pas-de-Calais, Coal in the, 293
Passenger Fares, Rise of, on the Monmouthshire Railway, 44
Patent Congress, International, 6, 79, 143
Patent Fuel Works at Bathgate, 235
Patent Slip at Wellington, New Zealand, 224, 453
Patent Wheel-Tyre and Axle Company, Owen's, Rotherham, Progress of, 249, 379
Pease, Mr. C., Death of, 28
Pease, Mr. J. B., Death of, 28
Peat Coal and Charcoal Company, Prospectus of the, 174
Pembroke Dock, Launch at, 387
Pembroke Dock Officials and the Lords of the Admiralty, 165
Pembroke and Tenby Railway Company, Half-Yearly Meeting of the, 183
Penarth and Cardiff, Meeting to procure Railway Communication, 469
Pennsylvania Railroad, Proposed Extension of the, 165
Pennsylvanian Coal, 25, 370
Pennsylvanian Iron Trade, The, 469
Persian Steam Navigation, Progress of, 165
Petroleum, American, The Exports of, 26
Philadelphia, Proposed New Air Line Railroad at, 280
Philadelphia and Reading Railway, America, New Steamers for the, 224
Philadelphia Street Railways, Receipts of the, 36
Philadelphia Water Supply, Extension of the, 215
Pig Iron Market, The Glasgow, 16, 28, 45, 71, 79, 111, 124, 142, 165, 183, 215, 235, 249, 279, 303, 323, 345, 369, 387, 405, 427, 449, 469, 487, 506
Pig Iron in the United States, 510
Pitman, A, to be Sent to Parliament, 340
Pitmen and their Wages, The Cleveland, 427
Pittsburg, America, The Iron Trade of, 198
Plans for Goderich Harbour, Canada, 280
Pontypool Pontnewynydd Works, Progress of, 482
Pontypool and Ross Railway, Progress of the, 520
Pontypridd, Steam Coal at, 207, 235
Population in South Wales, Overcrowding of the, 345
Port Chalmers and Dunedin Railway, Additions to the, 292
Port Darwin and Adelaide Railway, Progress of, 400
Port Glasgow and Greenock Gas Works, Progress of, 322
Port Glasgow Harbour, The Proposed Purchase of, 134
Port Jackson, New South Wales, Improvement of, 469
Port of Montreal, The, 91
Port Talbot Harbour, Commencement of Improvements in, 376
Postal Telegraphy, 393
Post Company, The "Rhand," 237
Post Harbour, Site Chosen for, 71
Potomac and Baltimore Railroad, Completion of Tunnel for the, 83
Practical Illustration of the Discharge Note System, 345
Presentation to the Manager of Ebbw Vale Iron Works, 345
Preservation of Timber, The, 469
Prestonpans, Mining Operation near, 427
Prideaux Patent Cement, 345
Prince Edward Island, Shipbuilding in, 187
Professor Henry on Ballooning across the Atlantic, 80
Professorship of Mathematics at the Royal Naval College, The, 235
Programme of the Trades Union Congress to be held at Sheffield, 345
Progress of Victoria, 404
Projects and Facts in Engineering, 464
Projected Central Asian Railway, The, 71, 332
Promotion, An Engineer's, 387
Proposed Anglo-French Submarine Tunnel, 301
Proposed Ceylon Canal, The, 323
Proposed Docks at Stockton, 369
Proposed Drainage of Smyrna, 340
Proposed Eight Hours' Movement in the North of England, 442
Proposed Great Street Improvements at Sheffield, 63
Proposed Meeting of the British Association in Glasgow, 215
Proposed New Undertakings and Extensions in South Yorkshire, 345, 404
Proposed River Improvements near Greenock, 369
Proposed Street Tramway at Swansea, 345
Proposed Testimonial to the Duke of Sutherland, 345
Proposed Train, Once a Week, A Bill for, in Australia, 356
Proposed Tunnel under the Tees, 340, 369
Proposed Wet Dock at Garrel Park, Greenock, 469
Prospects of the Iron Trade, 235
Prospectus of the Coal-Economising Gas Company, 427
Prospectus of a Company for the Utilisation of Slag, 387
Prospectus of R. Cook and Co., Hathersage Works, near Sheffield, 187
Prospectus of the Peat Coal and Charcoal Company, 174
Prospectus of the South and East Coast Railway, 442
Providence, New York, and Boston Railroad, Progress of the, 420
Province of Nelson, New Zealand, The, 218
Prussian Artillery, Experiments with, 88
Public Analyist for the Strand District, Appointment of, 315
Public Buildings in the United States, 187
Public Lands, United States, 126
Public Works in Canterbury, New Zealand, 110
Public Works in the United States, 420
Public Works in Western Australia, 267
Puddling Furnaces at Middlesbrough, Danks's, 124
Pump, New, for the Pacha of Egypt, 505
Pumping Machinery, Steam, in the Rhondda Valley, 369

Quarterly Meeting of the Cleveland Iron Trade, 10
Quarterly Report of the Glasgow Water Works, 45
Quebec Harbour, Construction of a Graving Dock for, 420
Quebec Harbour Improvements, 25, 187
Queensland, The Brisbane Bridge at, 353
Queensland, Copper in, 356
Queensland Lighthouse, Commencement of a New, 387
Queensland Locomotive, A, The First Constructed, 420
Queensland Northern Railway, Progress of the 318
Queensland Railway, Progress of, 492
Queensland Railways, Surveys for the, 449
Queensland Telegraphy, Progress of, 45, 143, 404
Queensland Tin, Considerable Production of, 187

Railroad Centre, An American, 415
Railroad Contract, A New American, 400
Railroad, The Illinois Central, Progress of the, 4
Railroad, Pennsylvania, Proposed Extension of the, 165
Rails, Belgian, 80
Rails for the Paris, Lyons, and Mediterranean Railway Company, 357
Rails, Steel, on the Central Pacific, 215
Rails, Steel, on the Chicago and North-Western Railway, 420
Rails, Steel, in Germany, The Contract Price of, 378
Rails, Steel, on the Western of France Railway, 400
Railway Brakes in Belgium, Contract for, 340
Railway Bridges, Indian, 15, 219
Railway, Caithness, Progress of the, 303
Railway, The Canada Southern, Progress of, 376
Railway, The Canadian Pacific, Progress of, 25, 100
Railway and Canal Company, The Monmouthshire, Half-Yearly Report of the, 267
Railway, The Central Pacific, Progress of, 114, 215, 220, 224
Railway, Chicago and North-Western, Locomotives on the, 400
Railway, Clifton, Extension, Progress of, 315, 520
Railway Company, The London and North-Western, 207
Railway, A Demerara, 93
Railway Facilities, Increase of, in the South-West, 405, 469
Railway Fares, Contemplated Rise of, by the Monmouthshire Railway Company, 44

Railway, Galata and Pera, Stoppage of Works on the, 240
Railway, The Grand Trunk of Canada, Progress of, 15, 122, 320, 362, 370
Railway, Great Southern, New South Wales, Extension of the, 329
Railway, The Great Western, Application to Parliament by the, 482
Railway, The Great Western of Canada, Progress of, 83, 194, 561
Railway, Holkar State, Progress of, 215
Railway, The Intercolonial, Progress of, 15, 122, 459
Railway, The Kansas Pacific, 25
Railway, The London and North-Western, in Wales, 303
Railway near Middlesbrough, Another, 427
Railway, The Monmouthshire, Progress of, 462
Railway, New, to Kilsyth, Scotland, 71
Railway, The Northern Pacific, Progress of, 25, 110, 161, 215, 324, 375, 400, 426, 500
Railway, Northern of Queensland, Repairs on the, 187
Railway Plant Company, French, Value of Work Executed by the, 25
Railway Progress, American, 257
Railway Progress, French, 497
Railway Projects, New, in Caithness-shire, 323
Railway, Proposed, in Orkney, 71
Railway, The Severn Bridge, Progress of, 315
Railway Sleeping Carriage Company, Mann's, 33
Railway Stations, New, Contracts for, 142
Railway Returns, The Central Argentine, 469
Railway, The Severn Bridge, 405
Railway, The Taff Vale, Progress of, 142
Railway, Tasmanian Main Line, Progress of, 282, 374, 376, 510
Railway, The Tees-side, and the Proposed Tunnel, 503
Railway Traffic, German Military, 96
Railway, The Tuapeka, New Zealand, Tenders for the, 224
Railway Working Expenses, Increase of, on the Monmouthshire Railway, 235
Railway Warehouses at Bristol, 497
Railways, American Narrow-Gauge, 25
Railways, Argentine, Progress of, 454
Railways, Brazilian, Progress of, 23, 340, 449
Railways, Canadian, Progress of, 293, 338, 370, 376, 492, 504
Railways in Canterbury, New Zealand, Contracts for, 224
Railways in Egypt, Contract for, 219
Railways, New Zealand, Progress of, 45, 83, 187, 224, 282, 452, 469, 493, 500
Railways, Queensland, Progress of, 492
Railways, Queensland, Surveys for the, 449
Railways in the Republic of Uruguay, 449
Railways, Russian, Progress of, 45
Railways, Servian, 117, 340
Railways, Spanish, 272
Railways, South Australian, Progress of, 71, 154, 215, 366, 411
Railways, Turkish, Progress of, 45, 80, 187, 246, 257, 265, 340, 350
Railways and Telegraphs, Egyptian, 187
Railways, Victorian, Progress of, 45, 83, 220, 434, 449
Ransome's Wood-Working Machinery, New Catalogue of, 43
Rebuilding Boston, 351
Receipts of the Ciudad Real and Badajoz Railway, 110
Receipts of the Philadelphia Street Railways, 36
Receipts of Railways in Canterbury, New Zealand, 83
Receipts, Yearly, of the American Pacific Mail Steamship Company, 4
Reclamation Works in Holland, 257
Reconstruction of the Tuileries, 267
Red River Bridge, A, Canada, 215
Red River, Survey of the, 280
Reduction in the Price of Coal at Sheffield, 404
Reduction in the Price of New Zealand Coal, 187
Reduction of Wages by Sir J. Brown and Company, Sheffield, 468
Regulation of Mines, Discussion on the, 315
Renfrewshire, Extensive Mineral Lease in, 79
Renishaw Colliery, Transfer of, 482
Reopening of the Darfield Main Colliery, 120
Reopening of the Delaware and Chesapeake Canal, 237
Reply of Lord Bute to a Memorial for Increased Dock Accommodation at Cardiff, 345
Report, Annual, of S. Fox and Company, Stockbridge, Sheffield, 143
Report of Mr. F. Bolton on the London Water Companies, 349
Report, Half-Yearly, of the Caledonian Railway Company, 249
Report, Half-Yearly, of the Falmouth Docks, 83
Report, Half-Yearly, of the North British Railway Company, 249
Report of Sir John Hawkshaw to the Greenock Harbour Trustees, 249
Report of Mr. J. Mackenzie on the Victorian Coalfields, 454
Report on Postal Telegraphy, 398
Report, Quarterly, of the Glasgow Water Works, 45
Report of the Sheffield United Gas Light Company, 323
Report on Water-Closets by the Glasgow Corporation Water Committee, 215
Reports, Artizans', on the Vienna Exhibition, 293
Reservoir, New, at Ihsondéré, for the Water Supply of Constantinople, 257
Reservoir, Proposed New, at Adelaide, 71
Resignation of Mr. W. Clarke, C.E., Calcutta, 449
Revenue of the Central Pacific Railroad, 114, 220
Revenue of the South Italian Railway, 80
Revenue of the Suez Canal from its Transit Service, 259
Rhode Island, Iron in, 426
Rhondda Valley, Meeting of Firemen in the, 28
Rhondda Valley, Steam Pumping Machinery in the, 369
Rhondda Valley, Strike of Colliers in, 165
Rhymney Iron Company and the Cardiff County Court, 44
Rhymney, Mr. Halliday at, 294
Rhymney Valley Colliers, Mass Meeting of the, 124
"Riband" Post Company, The, 337
Riches, Mr. T., appointed Locomotive Superintendent of the Taff Vale Railway, 302
Richmond, Virginia, Tunnel under, 126
Riflo, The Mauser, for the German Army, 165
Rio Preto Railway, Brazil, Narrow Gauge for, 25
River Clyde, Launches on the, 111
River and Harbour Improvements, American, 500
River Hudson, Tunnel under the, 15
River Improvements, Proposed, near Greenock, 369
River, The Missouri, Turning the Channel of, 36
River Murray, Improvement of the Mouth of the, 415
River Tees, Improvement of the, 183
Rivetting for Bridgework, Hydraulic, 236
Rocky Mountains Tunnel, Commencement of the, 216
Rocky Point, Fortune Bay, Canada, Lighthouse Erected on, 63
Rolling Mills and Steel Works, Creusót, Progress of the, 460
Rolling Stock in Belgium, 158
Rolling Stock in Canada, 257
Rolling Stock of the Eastern of France Railway, 25
Rolling Stock, Foreign, 224
Rolling Stock, New, for the North British Railway, 71
Rolling Stock on the Northern of France Railway, 123
Rolling Stock on the Northern Pacific, 400
Roman Railway, Traffic Receipts of the, 206
Ross and Monmouth Railway, 100
Ross and Pontypool Railway, 520
Rotherham Water Supply, 468
Roumelian Railway, Turkey, Opening of a Portion of, 187
Round House for Locomotives, An American, 71
Roundhay Park Railway Proposal, The, 369
Royal Naval College, The Professorship of Mathematics at the, 235
Royal Scottish Society of Arts, 79, 403, 449
Ruhr Coal Basin, The Production of, 187
Russian Railway, Great, Guaranteed Interest for the, 25
Russian Railways, Progress of, 45
Russian Weights and Measures, 393

Sailing Ship, Launch of the Largest ever Built on the Clyde, 345
St. Gothard Tunnel, Progress of the, 25, 143, 164 280, 420
St. John Harbour, Canada, Breakwater for, 25
St. John's, Water Supply of, 149
St. Louis Bridge, The, Progress of, 246, 512
Sale of Barry Island, near Cardiff, 44
Sale of Gas Stock of the Bristol United Gaslight Company, 469
Salt Pits at Middlesbrough, Progress of the, 183
San Francisco and Australia, New Line of Steamers between, 505
San Francisco, Mail Service, The, 419
San Francisco Mint, Progress of the, 400
San Paulo Railway, Goods Traffic on the, 354
San Paulo Railway, Working Expenses on the, 400
Sand Blast, Tilghman's, A New Application of, 156
Sanding-up of the Suez Canal, Contradiction of the, 4
Sanitary Conference in the South-West District, 100
Sarawak, Coal in, 469
Sarrebrück Mines, Quantity of Coal Produced at, 174
Sault Sainte Marie Canal, Improvements in the, 164
Scholarships, The Whitworth, 218, 420
Science and Art Department of the South Kensington Museum, 122
Science and Art, Edinburgh Museum of, 405
Scientific Societies of Scotland, The, 405
Scotch Blast Furnaces, The Number of, 124
Scotch Coal Trade, The, 183, 235, 279, 427, 469
Scotland, The Scientific Societies of, 405
Secretaryship of the Bristol and Exeter Railway, Mr. J. H. Matthews Appointed to the, 303
Serious Escape of Gas at Sheffield, 379
Servian Railways, Rejection of, by the Servian Government, 340
Servian Railways, Terms of Concession for the, 117
Severn Bridge and Railway Arbitration, 100
Severn Bridge Railway, Progress of the, 315, 405
Severn Tunnel, Progress of the, 83, 345
Severn and Wye Railway, Progress of the, 15, 44, 469
Sewage Difficulty in Glasgow, 215
Sewage, Ottawa, 292
Sewage Machines at the Vienna Exhibition, 174
Shale Oil Trade, The, at Johnstone, 215
Sheepbridge Iron and Coal Company, Annual Meeting of the, 214
Sheffield District, Parliamentary Projects for the, 419
Sheffield Filecutters and Forgers' Agitation, The, 83
Sheffield Tramways, Progress of, 165, 308
Sheffield United Gaslight Company, 323, 345
Sheffield Water Supply, Improvements in, 303
Ship Canal, An American, 174
Ship Canal, Another Great, 348
Ship Canal, Proposed, to Combwich, 44
Shipbuilding, Cleveland, 28, 45, 124, 143, 165, 207, 271, 369, 387, 405
Shipbuilding at Glasgow, 28
Shipbuilding in Prince Edward Island, 187
Shipbuilding Yard, New, at Glasgow, 517
Shipments of Gunpowder from the Clyde, 505
Shipwrights, Bristol Channel, 482
Short Time at the Briton Ferry Iron Works, 405
Short Time Movement at Sheffield, 45, 482
Silver Ore in New Zealand, 313
Skilled Workmen at Vienna, 24
Skolnes's Patent Gas Process, 427
Slag, Prospectus of a Company for the Utilisation of, 387
Sleeping Carriage Company, Mann's Railway, 33
Smiths' Shops at a Colliery, New, 379
Smyrna, Proposed Drainage of, 340
Snow Galleries on the Central Pacific Railroad, 229
Society of Arts, Royal Scottish, 79, 403, 449
Society of Arts Technological Examinations, 189
Society of Telegraph Engineers, Meeting of the, 422, 478
Somerset and Devon Railway, Opening of the, from Barnstaple to Taunton, 387
Somersetshire Coal, Rise in the Price of, 207
Somersetshire Collieries, 207
Soudan, Machinery for the, 24
South America and Belgium, 220
South American Telegraphic Progress, 23
South Australia, Gas in, 345
South Australian Railways, Progress of, 71, 154 215, 366, 411
South Australian Telegraphic Progress, 41, 449, 469
South Breakwater, Aberdeen, Completion of the, 279
South Durham, The Coal Trade of, 427
South Italian Railway, Revenue of the, 80
South Wales Atlantic Steamship Company, The, 28
South Wales Coal Trade, The, 203, 403
South Wales, Labour in, 15, 28, 469
South Wales Union Railway, Conversion of Gauge on the, 124
South-West, Mines Regulation Act in the, 28, 44, 405
South-West Tin-Plate Trade, Progress of the, 44, 303
South and West Yorkshire, Proposed Coal Exchange for, 129
South Yorkshire Coal Traffic, 129, 235, 373, 404, 505
South Yorkshire Companies, Dividends of, 111, 143, 187
South Yorkshire, Engineering in, 23, 63, 83, 111, 165, 214, 249, 279, 323, 345, 404, 449
South Yorkshire The Great Gale in, 505
South Yorkshire Miners' Demonstration, 15, 68
Southern Railway of New South Wales, Tenders for, 154
Southern States of America, The, and Liverpool, 223
Spanish Iron Minerals, 207
Spanish Navy, Strength of the, 361
Spanish Railways, 272
Special Rules in the Glasgow Coal Trade, Dispute on the, 45, 71, 111
Spiegeleisen, The Manufacture of at Sheffield, 187
Stamboul, Gas at, 54
Staten Island, Coal Depôt on, 110
Station, Proposed New, at Wells, 28
Statistics of the South Welsh Coal Traffic to London, 405
Steam Boiler Experiments, American, 483
Steam Coal, Discovery of a New Vein of, in Llanelly, 165
Steam Coal at Pontypridd, 207, 235
Steam Dredge, A Canadian, Built at Toronto, 111
Steam Dredger, A New, for Calcutta, 142
Steam Ferry at Middlesbrough, The Commencement of, 405
Steam Fire Engine, Floating, for Glasgow Harbour, 279
Steam Launch, An American, Built at San Francisco, 132
Steam Navigation, American, 71, 92, 227
Steam Navigation, Dutch, 15
Steam Navigation, Indian, 142
Steam Navigation, Persian, Progress of, 165
Steam Pumping Machinery in the Rhondda Valley, 369
Steam Safety Valves, Commission Appointed to Examine, in America, 293
Steam Sappers, The, and the Ashantee War, 505
Steam Shipbuilding, American, 372
Steam Shipping, Canadian, 292
Steam Tramcar, Grantham's Experiments with, 449
Steamer Inspection in New Zealand, 405
Steamer, New, for the Tyne, 122
Steamer Pharos, The, and the Northern Lighthouse Service, 287
Steamers, Light Draught, 525
Steamers, New, for the Philadelphia and Reading Railway, America, 224
Steamship Line, Another Transatlantic, 4, 136
Steamships, The Allan Line of, Lengthening the, 218
Steel Crank Axles, 122
Steel and Iron Institute, The, 71, 111
Steel Rails on the Central Pacific Railway, 215
Steel Rails on the Chicago and North-Western Railway, 429
Steel Rails in Germany, Contract Price of, 373
Steel Rails for the Great Western Railway of Canada, 361
Steel Rails on the Michigan Central Railway, 187
Steel Rails on the Western of France Railway, 400
Steel Springs, Thomson's Cushioned, 10
Steel Works, Landore, 482, 497
Stobcross Ferry, Proposed Alteration on, 517
Stockton, Proposed Dock at, 10, 369
Stone, Bath, Discovery of a Large Tract of, 183
Stone Culverts and Embankments for the Central Pacific Railroad, 224
Stoppage of Work on Tees-side, 10
Strait of Mackinaw, Attempts to Lay a Cable across the, 196
Strasburg and Kehl, Reconstruction of the Bridge between, 373
Strasburg, Official Visit to the Forts at, 410
Street Improvements at Sheffield, Proposed Great, 63
Street Railways, Philadelphia, Receipts of the, 36
Street Tramway, Proposed, at Swansea, 345
Strike of Colliers in the Rhondda Valley, 165
Strike, A Gas Consumers', at Taunton, 279
Strike of Ironmoulders at Middlesbrough, 165
Strike of Miners in New South Wales, Termination of, 25
Strike at Motherwell, Termination of the, 124
Strike Settled by Arbitration, 403
Strike of Sheffield Engineers, 15, 23, 45, 83, 111, 129, 165, 187, 279, 303, 505
Submarine Telegraphy in the Levant, 149
Submarine Tunnel, Proposed Anglo-French, 301
Suez Canal, Progress of the, 4, 33, 114, 124, 259, 280, 340, 453, 449, 500
Summerlee Iron Works and the Proposed Limited Liability Company, 343
Supply of Gas from Greenock Gas Works, 505
Survey by American Steamer for a New Pacific Cable, 236
Survey of Newfoundland for the Canadian Government, 99
Survey of the Red River, 280
Surveying Expedition for the Northern Pacific Railroad, 25
Surveys in Colorado, 184
Surveys in New Zealand, 187
Suspension Bridge, A New Wire, 111
Swamp Reclamation in New Zealand, 224, 420
Swansea District, Proposed Erection of Iron and Steel Works in the, 503
Swansea, Dock Accommodation at, 207, 272, 313
Swansea Shipping Company, 420
Swansea Tramways, Grant for the, 369
Swansea Vale Railway, Half-Yearly Account of the, 165
Swatara, American Sloop of War, Alteration of the, 340
Swinging Saloon Ship, The New Bessemer, 442
Sydney, New South Wales, Coal at, 420
Sydney New Town Hall, 194
Sydney, Nova Scotia, Extension of, 215

Taff Vale Railway, Appointment of Mr. T. Riches as Locomotive Superintendent, 303
Taff Vale Railway, Progress of the, 142
Tanjore and Madras Railway, Commencement of the, 449
Tannett, Walker, and Company v. Hannay and Sons, Ironworkers, 823
Tasmania, The Discovery of Coal in, 215
Tasmanian Coal, Company for the Working of, 400
Tasmanian Iron Ore, 71
Tasmanian Main Line Railway, Progress of the, 282, 374, 376, 510
Tasmanian Matters, 374
Tasmanian Metallurgy, 45, 71, 121, 265, 510
Taunton Locomotive Company, America, Export of Locomotives by the, 415
Tay Bridge Works, Dreadful Calamity at the, 165
Tay Bridge Works, Progress of the, 183, 405, 469
Technological Examinations, The Society of Arts, 189
Tees-side Railway and the Proposed Tunnel, 503
Tees-side, Stoppage of Works on the, 315, 340
Telegraph, An American Military, 293
Telegraph, The Australian Overland, 313
Telegraph Cable in Connexion with the Tay Bridge, 405
Telegraph for the Chinese, 316
Telegraph, The Duplex, 223
Telegraph Engineers, The Society of, 422, 478
Telegraph to Japan from America, 273
Telegraphic Progress, American, 80, 274
Telegraphic Progress, Brazilian, 25, 48, 434
Telegraphic Progress, New Zealand, 23, 376, 404
Telegraphic Progress, Queensland, 45, 143, 404
Telegraphic Progress, South American, 25
Telegraphic Progress, South Australian, 41, 449, 469
Telegraphic Progress, Western Australian, 109
Telegraphy, Postal, 398
Telegraphy, Submarine, in the Levant, 149
Telegraphy in Turkey, 71, 265, 274
Telegraphy in the West, 83
Telford Medal, Award of a, to Mr. Deas, C.E., 28
Tenby and Pembroke Railway Company, Half-Yearly Meeting of the, 183
Tenby Water Supply, 194
Tender for the Bristol General Station, 387
Tenders for the Northern Pacific Railroad, 215
Tenders for Victorian Railways, 83
Termination of the Bristol Miners' Conference, 315
Termination of the Strike at Low Stubbin Colliery, 45
Terminus for the Northern Pacific Railroad, 161
Testimonial to Mr. Colquhoun on his Departure from Maesteg, 83
Testimonial to Mr. P. C. Owen, 200
Testimonial to the Duke of Sutherland, Proposed, 345
Testing Boilers in the United States, 462
Thomson's Cushioned Steel Springs, 10
Tides, The Utilisation of, 457
Tilghman's Sand Blast, A New Application of, 156
Timber, The Preservation of, 469
Tin in New South Wales, 327
Tin-Plate Trade of the South-West, Progress of the, 44, 303
Tin, Queensland, Considerable Production of, 187
Tin Works, Melyn, Work Resumed at, 320
Tin Works, The Vernon, 469
Toledo, Wabash, and Western Railway, Progress of the, 420
Ton, The Imperial, Meeting for the Adoption of the, 100
Tonnage of Coal by Rail from Sheffield to London, 45
Toronto, Grey, and Bruce Railway, Progress of, 25, 194, 301, 426, 439
Torpedo Boat, An American, 493
Town Hall, New, at Sydney, 194
Town Street, Coal Mining in a, 379
Trade at Merthyr Tydvil, 441, 497
Trade at Newport, 106, 183, 207, 441, 520
Trades Union Congress at Sheffield, Official Programme of the, 345
Traffic, Goods, on the San Paulo Railway, 354
Traffic Improvements at Birkenhead, 516
Traffic on the Toronto, Grey, and Bruce Railway, Great Increase of, 25
Train Once a Week, A, 266
Tramcar, Grantham's Steam, Experiments with, 449
Tramway, Proposed Street, at Swansea, 345
Tramways, Bristol, Progress of, 100
Tramways, Constantinople, Progress of, 442
Tramways, Greek, Application for a Concession for, 313
Tramways, Newport, Progress of, 165
Tramways, Sheffield, Progress of, 165, 303
Tramways, at Swansea, Grant for the, 369
Tramways, Wire, 242
Transatlantic Cable, The Fifth, 224
Transatlantic Line of Steamers, Another, 4, 136

Transatlantic Steam Navigation Contracts, 227
Transfer of Renishaw Colliery, 462
Transfer, Reported, of the Oaks Colliery, 15
Tredegar Iron and Coal Company, 16
Trestles on the Central Pacific Railroad, 294
Trial of the Fell System of Railway in Brazil, 187
Trial of the Heberlein Brake, 294
Trial Trip with a New Steam Dredger for Calcutta, 143
Trial of the Westinghouse Air Brake, 412
Troop Movements by Railway, 183
Truro, Improvements at, 320
Tuapeka Railway, New Zealand, Tenders for, 224
Tuileries, Reconstruction of the, 267
Tunnel, The Hoosac, Progress of, 25, 71, 265, 273, 294
Tunnel, Proposed, Anglo-French Submarine, 301
Tunnel under Richmond, Virginia, 136
Tunnel, A, under the River Hudson, 15
Tunnel through the Rocky Mountains, Commencement of the, 216
Tunnel, The St. Gothard, Progress of, 25, 143, 164, 280, 420
Tunnel, The Severn, Progress of the, 83, 345
Tunnel under the Tees, Proposed, 340, 369
Turkey, Locomotives in, 265
Turkish Contracts, 103, 163
Turkish Gunboats, 45
Turkish Ironclad, Completion of a, 174
Turkish Ironclads, the Number of, 71
Turkish Minerals, Discoveries of, 278
Turkish Monitors, The Number of, 71
Turkish Ordnance, 142, 163, 224
Turkish Railway Matters, 80
Turkish Railways, Progress of, 45, 80, 187, 246, 257, 263, 340, 350
Turkish War Department, Present of Sixty Six-pounder Krupp Guns to the, 224
Turnberry Lighthouse, Ayrshire, First Lighting of the, 315
Tyne, Improvements on the, 28
Tyne, New Steamer for the, 122

United Gas Light Company, Sheffield, 323, 345
United States Army, The, 402
United States Arsenal, Bridesburg, Extent of, 136
United States, Coal in the, 506
United States, The Gauge Question in the, 400
United States, Irrigation in the, 427
United States, Krupp in the, 469
United States Mint, The, 449
United States Navy, Progress of the, 114, 215, 220, 272, 420, 504
United States, Pig Iron in the, 510
United States Public Lands, 136
United States Public Works in the, 420
United States Sloop of War Swatara, 346
United States, Testing Boilers in the, 462
United States, The, and Wales, 257
University Department of Engineering, Glasgow, 369
Uruguay, Railways in the Republic of, 449
Utilisation of Slag, Prospectus of a Company for the, 347
Utilisation of Tides, 447
Universal Exhibition, The Vienna, 161, 174, 183, 203, 238

Value of British Columbian Gold forwarded in Fifteen Years, 420
Value of Sales made by the John Cockerill Company, Belgium, 358
Valves, Steam Safety, Commission appointed to Examine, in America, 293
Various Engineering Matters in South Yorkshire, 214
Vernon Tin Works, 469
Versailles, International Concours at, 129
Victoria, Coal in, 71, 454
Victoria, Increase in the Population of, 404
Victoria, New Discovery of Iron in, 265
Victorian Coalfields, Report of Mr. J. Mackenzie on the, 454
Victorian Railway Progress, 43, 83, 220, 434, 449
Vienna, The Americans at, 37
Vienna Exhibition, The, 161, 174, 183, 203, 238
Vienna Exhibition, Artisans' Visit to the, 75
Vienna Exhibition and the International Patent Congress, the, 143
Vienna Exhibition, Medal of Merit to Messrs. Gwynne and Co., 174
Vienna Exhibition, Medal of Merit to Messrs. Laird, at the, 174
Vienna Exhibition, Medal of Merit to Messrs. Whitley Partners at the, 238
Vienna Exhibition, Medal of Merit to Messrs. J. H. Wilson and Co., at the, 238
Vienna Exhibition, Sewing Machines at the, 174
Vienna, Working Men at, 24
Vintner's System of Communicating with Divers, 462
Virginian Coal and Iron, Development of, 224, 328
Visitors to the Vienna Exhibition, The Number of, in August, 203

Wabash, Toledo, and Western Railway, 420
Wages, Another Reduction in, at Sheffield, 482
Wages Question, The, in the North of England, 235, 271, 303, 315, 437, 466, 487, 505
Wages, Reduction of, by Sir J. Brown and Company, Sheffield, 466
Wagon Company, The North of England, 45
Waltars and New Plymouth Railway, New Zealand, Commencement of the, 362
Wakefield, A New Coalfield near, 143
Wales and the Midland Railway, 279
Wales and the United States, 257
Wallsend Slipway Company's Works, Newcastle-on-Tyne, Opening of the, 404
Walter Presses for the *New York Times*, 111
Water-Closets, Report of the Glasgow Corporation Water Committee on, 215
Water Companies, London, Report of Mr. F. Bolton on the, 349
Water Storage Accommodation, Aberdeen, 345
Water Supply of Baltimore, 306
Water Supply, The, of Boston, America, 187
Water Supply, The, of Chippenham, 44
Water Supply Company, French General, 222
Water Supply, The, of Constantinople, 224, 257
Water Supply, Greenock, Reduction of Assessment, 225
Water Supply, Huddersfield, 349
Water Supply of Ottawa, The, 308
Water Supply of Philadelphia, 215
Water Supply, Rotherham, 483
Water Supply of St. John's, 149
Water Supply, Sheffield, Improvements in, 303
Water Supply of Tenby, 124
Water Works at Beyrout, Commencement of, 143
Water Works, Chippenham, 469
Water Works, Dundee, Contracts for the, 505
Water Works, Edinburgh, Progress of the, 71
Water Works, The Leeds, 62
Water Works, The, at Lintrathen, 469
Water Works, New, at Ballater, Scotland, 249
Weights and Measures, Russian, 393
Welcome to Gas Consumers, 320
Wellington, New Zealand, Patent Slip at, 224, 453
Wells, Proposed New Station at, 28
Welsh Colliers, Mass Meeting of the, 83
Welsh Colliers and Miners, Demonstration of, 142
Welsh Iron Trade, The, 124
West of Scotland Association of Gas Managers, Annual Meeting of the, 16
West Wemyss, Fifeshire, Opening of a New Dock at, 249
Western Australia, Public Works in, 267
Western Australian Telegraphic Progress, 100
Western Pumping Station, Pimlico, Laying the Foundation Stone of the, 75
Western Wagon Company, The, 183
Westinghouse Air Brake, Trial of the, 412
Westinghouse Continuous Brake, Extensive use of the, 337
Wet Dock, at Garvel Park, Greenock, 469
Wheat-Cleaning Machinery, Prizes Offered for, in Australia, 420
Wheel-Cutting Machine, Zimmerman's, at the Vienna Exhibition, 410
Wheel-Tyre and Axle Company, Owen's Patent, Rotherham, Progress of, 349, 379
Whitley Partners, Messrs., Conversion of Into a Limited Company, 449
Whitworth Scholarships, The, 218, 420
Widening New Jersey Railroad, 153
Widening the North Bridge, Edinburgh, 111, 387
Wigpool Iron Ore Company, The, 237
Windmill Point, Canada, Erection of a Lighthouse on, 25
Wire Suspension Bridge, A New, 111
Wire Tramways, 242
Wood-Working Machinery, Ransome's New Catalogue of, 43
Work, Stoppage of, on Tees-side, 10
Working Expenses on the Chicago and North-Western Railway, 420
Working Expenses on the San Paulo Railway, 400
Working Men at Vienna, 24
Working Men's College, Great Ormond-street, 249
Works, Tay Bridge, Progress of the, 183, 405, 469
Works on Tees-side to be Stopped, 315, 340
Wright's Patent Air Gas, 28
Wye and Severn Railway, Progress of the, 15 44, 469

Yellowstone River, America, Total Length of the, 136
Yorkshire Colliery Managers, Examination of, 520

Zimmerman's Wheel-Cutting Machine, at the Vienna Exhibition, 410

LETTERS TO THE EDITOR.

ACCIDENT, The Wigan—Stock Rail, 121
Agricultural Show, The Royal—James and Frederick Howard, 93
Air Gas—N. S., 203
Albert Bridge, Chelsea, The—W. D., 404
American Bridges—Charles Macdonald, 93
Ancient Lathe, An—J. S., 236
"A *Very* Remarkable Locomotive"—Thomas Middelton, 444
A *Very* Remarkable Locomotive—X. Y. Z., 427, 464
Awards, The Vienna Exhibition—Aveling and Porter, 183
Awards, The Vienna Exhibition—Clayton and Shuttleworth, 183
Awards of the Vienna Society of Arts, The—R. W. Winfield and Company, 291

Barracks, The New Glasgow—Samuel Thomas Clarke, 274
Bede's Corliss Engine—Bede and Company, 103
Bede's Corliss Engine—George Dowell, 54
Bede's Corliss Engine—Oswald Rose, 79
Bells *v.* Steel Bars—C. W., 63
Blast Furnace, The Büttgenbach—F. Büttgenbach, 227
Blast Furnaces—J. Stummer-Traunfels, 174
Boilers, Safety—J. and F. Howard, 356
Boilers, Water-Tube—Aquafluens, 464
Boilers, Water-Tube—Conrad Knap, 487
Boilers, Water-Tube—Edward Mirchin, 274
Boilers, Water-Tube, of the Montana—John Watt, 388
Boilers, Water-Tube, of the Montana—An Old Jarrovian, 388
Boilers, The Water-Tube, of the Steamship Montana—C. E., 202
Boilers, Water-Tube, of S.S. Montana—W. J. B., 327
Bowstring Girders, The Strains on—T. Claxton Fidler, 315
Bowstring Girders, Strains upon—T. Massinger, 349
Bridge, The Albert, Chelsea—W. D., 404
Bridge, Brisbane—Robinson and I'Anson, 400, 444
Bridge, Brisbane—J. B. Redman, 388, 431
Büttgenbach Blast Furnace, The—F. Büttgenbach, 227

Centrifugal Pumping Machinery—Enquirer, 79
Coal Gas Impurities—Nemo, 135, 161
Continental Stationary Engines—C. B., 375
Cooling the Edges of Cutting Tools—Joshua Horton, 203
Corliss Engine, Bede's—Bede and Company, 103
Corliss Engine, Bede's—George Dowell, 54
Corliss Engine, Bede's—Oswald Rose, 79
Corliss Engines at the Vienna Exhibition—Socin and Wick, 227
Corliss Engines at Vienna—William Inglis, 55
Corliss Valve Gear—Mechanical Engineer, 444
Cornish Engines—A Mechanical Engineer, 196
Cornish Engines—A Mining Engineer, 143
Cornish Engines—William Oxford, 196
Cornish Pumping Engines, Duty of—A Mechanical Engineer, 132

Danger Signals—T. S. Hoxham, 196
"Dingler Engine," The, at Vienna—W. I. Blackburn, 461
Dover Harbour—J. B. Redman, 130, 185, 202, 453, 509, 529
Dover Harbour—J. C. Hoseason, Captain R.N., 472
Drainage Competition, Margate—Competitor, 295
Dudgeon's Rotary Engine—W. Hunter, 444, 461
Duty of Cornish Pumping Engines—A Mechanical Engineer, 132
Dynamite and Lithofracteur—M. Paterson, 372
Dynamite and Lithofracteur—P. F. Nursey, 375

Economisers, Fuel, at the Vienna Exhibition—Joseph Twibill, 56
Edges of Cutting Tools, Cooling the—Joshua Horton, 203
Engine, The "Dingler," at Vienna—W. I. Blackburn, 461
Engines, Corliss, at the Vienna Exhibition—Socin and Wick, 227
Engines, Corliss, at Vienna—William Inglis, 55
Engines, Cornish—A Mechanical Engineer, 132, 196
Engines, Cornish—A Mining Engineer, 143
Engines, Cornish—William Oxford, 196
Engines, Portable, at Vienna—S. Lewin, 7
Expansion Links—W. E. Carlile, 103
Explosion of a Howard's Boiler—Howard's Boiler, 349, 375
Explosion of a Howard's Boiler, The—James and Frederick Howard, 372

Fifteen-Ton Steam Hammer, The, at the Vienna Exhibition—Märkische Maschinenbauanstalt, 404
Five, Two and Two Make—Nozzle Boiler, 143
Five, Two and Two Make—Papageno, 121
Floating Derrick, The One-Hundred Ton—Cornelius H. Delamater, 79
Foundations, Pneumatic—James B. Eads, 195
Freeboard of Ships, The—F. S., 461
Freeboard of Ships, The—H. H. W., 422, 461
Freeboard of Ships, The—H. K. W., 411, 452, 487
Fuel Economisers at the Vienna Exhibition—Joseph Twibill, 56
Fuel, Locomotive—A. Romaine Wraggs, 176
Fuel Question, The Peat—J. Lyster, 6
Fuel Question, The Peat—J. M. C. Meadows, 24, 63
Fuel Question, The Peat—W. M. Campbell, 24, 54
Furnace, The Büttgenbach Blast—F. Büttgenbach, 227
Furnaces, Blast—J. Stummer-Traunfels, 174

Gas, Air—N. S., 203
Gas Impurities, Coal—Nemo, 135, 161
Gas Process, Skoines's—N. S., 464

Harbour, Dover—J. B. Redman, 130, 185, 202, 453, 509, 529
Harbour, Dover—J. C. Hoseason, Captain R.N., 472
Hall's Locomotive—J. Hall, 349
Hammers, Steam, at the Vienna Exhibition—Robert Nuttall, 203
Helical Pumps—Brotherhood and Hardingham, 291
"Honour to Whom Honour," &c.—Fair Play, 311
Howard's Boiler, Explosion of a—Howard's Boiler, 349, 375
Howard's Boiler, Explosion of a—James and Frederick Howard, 372

Information Wanted—Ralph H. Tweddell, 409
Ironclads, Our—E. Gardiner Fishbourne, 93

Jackets, Steam—E. R. and F. Turner, 103
Joining Pipes—Prior, 123

Lamp, Wright's Patent—Rennie and Wyett, 245
Lathe, An Ancient—J. S., 236
Light, Wright's Patent—N. S., 279
Links, Expansion—W. E. Carlile, 103
Lithofracteur and Dynamite—M. Paterson, 372
Lithofracteur and Dynamite—Perry F. Nursey, 375
Locomotive Fuel—A. Romaine Wraggs, 176
Locomotive, Hall's—J. Hall, 349
Locomotive, The Meyer—Ad. Meyer, 36
Locomotive, A *Very* Remarkable—X. Y. Z., 427, 464
"Locomotive, A *Very* Remarkable"—Thomas Middelton, 444

Margate Drainage Competition—Competitor, 295
Materials, Torsional Resistance of—H. C. C., 327
Meyer Locomotive, The—Ad. Meyer, 36

Narrow Gauge, The Progress of—H. F., 372
Narrow Gauge Railways—Narrow Gauge, 7
Narrow Gauge Railways—Robert F. Fairlie, 7, 24
New Glasgow Barracks, The—Samuel Thomas Clarke, 274
North Sea Ship Canal, The—Charles Burn, 41

Office, The Patent—J. G. Claxton, 203
One-Hundred-Ton Floating Derrick, The—Cornelius H. Delamater, 79
Our Ironclads—E. Gardiner Fishbourne, 93

Packing, Plaiting—A Packer, 203
Patent Gas, Skoines's—S. W. Smith, 453
Patent Gas, Skoines's—N. S., 464
Patent Office, The—J. G. Claxton, 203
Petroleum Shells—Iron Cross, 372
Peat Question, The—J. Lyster, 6
Peat Question, The—J. M. C. Meadows, 24, 63
Peat Question, The—Walter M. Campbell, 24, 54
Piers, Bridge—Inquirer, 24
Pipes, Jointing—Prior, 123
Plaiting Packing—A Packer, 203
Pneumatic Foundations—James B. Eads, 195
Pneumatic Transmission—W. Cawthorn Unwin, 461, 497
Portable Engines, Steam-Jacketted Cylinders for—H. Sumner, 54
Portable Engines, Steam-Jacketted Cylinders for—Richard Garrett and Sons, 54, 64, 63
Portable Engines, Steam-Jacketted Cylinders for—E. R. and F. Turner, 103
Portable Engines at Vienna—S. Lewin, 7
Press, The Victory—P., 143
Progress of Narrow Gauge, The—H. F., 372
Propulsion, Screw—C., 512
Propulsion, Screw—N. D. Spartali, 426, 453
Propulsion, Screw—Robert Griffiths, 453
Pumping Machinery, Centrifugal—Enquirer, 79
Pumps, Helical—Brotherhood and Hardingham, 291

Railway Speeds—Historicus, 262
Railways, Narrow Gauge—Narrow Gauge, 7
Railways, Narrow Gauge—Robert F. Fairlie, 7, 24
Rotary Engine, Dudgeon's—W. Hunter, 444, 461
Royal Agricultural Show, The—James and Frederick Howard, 93

Safety Boilers—James and Frederick Howard, 356
Scholarships, The Whitworth—A Fitter, 235
Scholarships, The Whitworth—A Whitworth Scholar, 295
Scholarships, The Whitworth—A "Would-be" Competitor—274
Screw Propulsion—C., 512
Screw Propulsion—N. D. Spartali, 426, 453
Screw Propulsion—Robert Griffiths, 453
Sewage, The Utilisation of—Felix Target, 131
Shells, Petroleum—Iron Cross, 372
Ship Canal, The North Sea—Charles Burn, 41
Ships, The Freeboard of—F. S., 461
Ships, The Freeboard of—H. H. W., 422, 461
Ships, The Freeboard of—H. K. W., 411, 452, 487
Signals, Danger—T. S. Hoxam, 196
Skoines's Gas Process—N. S., 464
Skoines's Patent Gas—S. W. Smith, 453
Speeds, Railway—Historicus, 262
Stationary Engines, Continental—C. B., 375
Steam Hammer, The 15-Ton, at the Vienna Exhibition—Märkische Maschinenbauanstalt, 404
Steam Hammer, Zimmermann's—An English Engineer, 295
Steam Hammers at the Vienna Exhibition—Robert Nuttall, 203
Steam Jackets—E. R. and F. Turner, 103
Steam-Jacketted Cylinders for Portable Engines—H. Sumner, 54
Steam Jacketted Cylinders for Portable Engines—Richard Garrett and Sons, 54, 64, 63
Steel Bars *v.* Bells—C. W., 63
Strains of Bowstring Girders, The—T. Claxton Fidler, 314
Strains upon Bowstring Girders—T. Massinger, 349

Torsional Resistance of Materials—H. C. C., 327
Transmission, Pneumatic—W. Cawthorne Unwin, 461, 497
Two and Two Make Five—Nozzle Boiler, 143
Two and Two make Five—Papageno, 121

Valve Gear, Corliss—Mechanical Engineer, 444
Very Remarkable Locomotive, A—Thomas Middelton, 444
Very Remarkable Locomotive, A—X. Y. Z., 427, 464
Victory Press, The—P., 143
Vienna Exhibition Awards, The—Aveling and Porter, 183
Vienna Exhibition Awards—Clayton and Shuttleworth, 183
Vienna Society of Arts, Awards of the—R. W. Winfield and Company, 291

Wanted, Information—Ralph H. Tweddell, 409
Water-Tube Boilers—Aquafluens, 464
Water-Tube Boilers—Conrad Knap, 487
Water-Tube Boilers—Edward Mirchin, 274
Water-Tube Boilers of the Montana—John Watt, 388
Water-Tube Boilers of the Steamship Montana, The—C. E., 202
Water-Tube Boilers of the Montana—An Old Jarrovian, 388
Water-Tube Boilers of S.S. Montana—W. J. B., 327
Whitworth Scholarships, The—A Fitter, 235
Whitworth Scholarships, The—A Whitworth Scholar, 295
Whitworth Scholarships, The—A "Would-be" Competitor, 274
"Whom Honour, Honour to," &c.—Fair Play, 311
Wigan Accident, The—Stock Rail, 121
Wright's Patent Lamp—Rennie and Wyett, 245
Wright's Patent Light—N. S., 279

Utilisation of Sewage, The—Felix Target, 131

Zimmermann's Steam Hammer—An English Engineer, 295

Printed for the Proprietor by CHARLES WHITING, at Beaufort House Printing Offices, 30 and 32, Duke Street, in the Parish of St. Giles-in-the-Fields, and Published by CHARLES GILBERT, at the Office of "ENGINEERING," No. 97, Bedford-street, in the Parish of St. Paul, Covent Garden, in the County of Middlesex.—Friday, January 16, 1874.